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Gas Lighting versus Electrical Lighting for Public Streets of Large Towns.

[By a "LONDONER."]

An important and interesting competition between two systems of street lighting, in important thoroughfares of the populous city of Manchester, has taken place, and the results obtained have been critically analyzed by two experts, one on behalf of each system. One street has been lighted by gas and another by electricity, the widths of each being approximately equal, from 20 to 22 yards. The former system was the modern high pressure gas lamp system, whilst the latter is the flame arc lamp system. The Corporation was desirous of ascertaining the relative advantages of the two systems, and in particular to compare their costs on a basis of equal illumination. The two experts have prepared separate and, to some extent, antagonistic reports, in which, however, they agree upon the following points:

First.—That, for all practical purposes, the degree of illumination in the two streets is approximately equal.

Second.—That, based upon the figures of costs of gas and current given by the respective departments of the Corporation, the arc lamps as used are provided at an annual cost, which is slightly less than the gas lamps as used.

Third.—That, as a comparison between the possibilities of arc lighting and high pressure gas lighting, the results are vitiated by the fact that the high pressure gas lamps are giving an efficiency very much below similar lamps when properly installed and adjusted.

The investigations extended over a period of about 2 months during this summer, and the method followed was substantially that of taking photometric readings of the candle power of the lamps and the intensity of illumination at various selected points in the streets, noting the gas and current consumption, the cases of light failure and so on. With regard to the photometer observations, there was some little difference in the methods adapted by the two experts, but both took direct readings of the candle power at various angles, and also readings of the illumination on a horizontal surface placed near the ground; namely, 3 feet by one expert and 15 inches by the other.

The measurements of candle power give the actual light-emitting power of the lamps, as viewed from the particular angle and position selected by the experts; such readings are independent of the distance of the lamp itself, except, of course, in smokey or foggy atmospheres; but they depend very greatly upon the angles chosen, as the distribution of the light is far from uniform. Thus one expert gives the mean candle power at an angle of from 20° to 25° with the horizontal as 2,970 for the arcs and 1,750 for the gas lamps, but when viewed from an angle of 45°, the values become 3,170 and 1,670 respectively. The other expert gives rather different values; at 20° the candle power being 2,949 for electricity and 2,173 for gas, whilst at 75° the values are 1,478 and 1,558, gas having the advantage. Thus not only is the candle power dependent on the angle of view, but the relative strengths do not change equally with the angle in the case of electric arcs and high pressure gas lamps.

It seems to follow that the most desirable distribution is an increase in candle power, as the angle to the horizontal becomes less, down to 15° or 20°. Ideal distribution is not obtained at present; there is a shadow below the arcs and the gas lamps come very near perfection. To some extent the particular light distribution of a type of lamp can be allowed for by suitably choosing the height and distance apart of the lamps. Thus, judging from the distribution, the ratio of height to horizontal distance should be greater for the arcs than for the gas lamps. One of the experts appears to be of opinion that advantages in other directions would be secured by lowering the gas lamps from 26 feet 6 inches to 20 feet, and by increasing the distance apart from 107 feet to 130 feet. The arcs are spaced 121 feet at a height of 27 feet 6 inches.

It is generally considered that horizontal illumination, which is measured by the brilliancy of a horizontal surface, is in some respects a better criterion than candle power. It is influenced, however, by the reflecting qualities of adjacent buildings and other objects. The gas expert claims in his report that, both under the lamps and midway between them, the illumination, as expressed in foot candles, is appreciably better in the street lighted by gas than in the one lighted by electricity. The electrical expert, on the other hand, arrives at an opposite conclusion, but perhaps the best commentary on this divergence is the first of the three conclusions jointly agreed to by the experts, mentioned above. It is desirable to add that the tests were made in June and July, and that the summer is scarcely the best time for such tests; as not only is there some sky light, but the slight fogs common during the winter months are more potent with some kinds of lighting than with others. The electrical expert expressly omits any comparison of the quality of the lights, but the gas expert favors gas lighting in this matter.

Reference can now be made, without comment, to the costs of lighting by gas and electricity. The gas and the electricity committees each gave the experts certain figures as a basis. The figures of costs in the two reports do not, unfortunately, agree strictly; but

the following figures are about the average given in cents and decimals:

	Gas, ½ Night.	Electricity, ½ Night.
Cost of gas per 1,000 cubic feet, or electricity per unit	28.32	2.20
Cost per lamp per hour	2.87	1.80
Cost per mile of street per hour	142.0	78.6
Cost of gas and current per lamp	2.258	1.304

It is assumed that the half-night lamps burn 2,000 hours per annum; they are turned out at 11 or 11:30 P.M.; after that hour small ordinary lamps are used in their place.

In the case of the electrical lamps every alternate one is extinguished at that hour. It follows that a lower price is charged for electricity for the all-night lamps, but nothing like the same reduction would be permissible in the case of gas; that gives the electrical lamps an undue or fictitious advantage in the above schedule. The costs given above are the net costs of production, and capital charges on the street lamp equipments have not been included; it is reported that the capital outlay works out at about $173 per arc lamp and $240 per gas lamp, excluding cables or gas pipes to the lamps; but these figures are not a very sure guide.

Several qualifications have to be taken into account before drawing any conclusions from the data given above. The electric lamps appear to have been well chosen, erected and adjusted; they were in fact highly efficient and reflect considerable credit on the Corporation's electrical engineer and his staff. Unfortunately the same cannot be said of the gas lamps. The gas expert does not hesitate to criticize the arrangement of the lamps and their installation. Moreover he emphatically states that they were working at low efficiency, only 27 candles per cubic foot of gas instead of 50, or, as a minimum, 40. That the electrical expert agrees substantially with this last statement is clear from the third conclusion quoted above from their joint report. Assuming an efficiency of 45 candles per cubic foot the corrected cost for the gas lamps becomes 1.966 cents. At that figure electricity, subject to the qualifications made above, has very little advantage, and it seems likely that further and more exhaustive trials of gas lighting may be made. There does not appear at present sufficient justification for substituting electrical for gas street lighting, and we may continue to see the two systems in use in different streets of the same town. For streets, which receive their most important illumination from shops, the problem is quite different, as is also the problem of residential and secondary streets; for the latter arcs are generally too powerful, and the contest will lie between incandescent gas and incandescent electric lamps. The relative costs of gas and electicity are in that case more likely to favor gas. Nobody would draw the conclusion that electric street lighting is everywhere preferable to gas on the strength of the reports reviewed above.

Details of the Gas Tests.—The two thoroughfares in which the tests were made are in the center of the city, at right angles to each other, and the traffic is very heavy. A distance containing 4 lamps was taken in each street; the distances between the gas lamps were 98 feet 6 inches, 118 feet 6 inches, and 104 feet 10 inches. The distances varied because the buildings to which the cables are attached, from which the lamps are suspended, would not permit of exactly similar distances. The lamps were suspended over the center of roads. For horizontal illumination the observations were made: (a) Below each lamp: (b) in the center of the road, half way between each lamp; (c) on the edge of the footpath, half way between each lamp. For direct illumination, or candle power, the measurements were taken 4 feet from the ground at the test positions mentioned above + 20° below horizontal; also at positions 6 feet from a perpendicular from each lamp (that is + 75° below horizontal.)

The gas expert and his assistant, in order to arrive at an impartial comparison between the lighting of two thoroughfares, carried out a large number of photometric readings, which were of a two fold character: Tests of the illumination thrown on the screen of the photometer; tests of the candle power of the lamps by direct readings at different angles. The average foot-candle value was as follows:

(a) *Under the Lamps—Horizontal Illumination.*

	Foot-Candles.		Foot-Candles.
Gas Lamp No. 1	1.57	Arc Lamp No. 1	0.87
" No. 2	1.60	" No. 2	0.94
" No. 3	1.18	" No. 3	0.44
" No. 4	1.5	" No. 4	1.26
Mean of above	1.46	Mean of above	0.88

Horizontal illumination falling on photometer when placed on ground vertically, with screen horizontal and 15 inches above ground.

The high pressure gas installation consists of Keith, high pressure suspension lamps, each with 3 burners and inverted mantles. The burners have a nominal consumption of 25 cubic feet per hour each; they are supplied from a compressor each, in a neighboring square, at an average pressure of from 55 inches to 60 inches water column. The high pressure main from which the lamps derive their gas is a common, high pressure main, used for public and private lighting, supplied by a compressor, capable of delivering 10,000 cubic feet of gas per hour at approximately 80 inches water column.

Between the Lamps, along Center of Road.

	Foot-Candles.		Foot-Candles.
Between gas lamps No. 1 and 2	.309	Between arcs 1 and 2	.222
" " " No. 2 " 3	.238	" " 2 " 3	.270
" " " No. 3 " 4	.290	" " 3 " 4	.264
Mean of above	.279	Mean of above	.252

Between the Lamps, along Foot Path.

	Foot-Candles		Foot-Candles.
Between gas lamps No. 1 and 2	.274	Between arcs 1 and 2	.231
" " " No. 2 " 3	.222	" " 2 " 3	.260
" " " No. 3 " 4	.254	" " 3 " 4	.262
Mean of above	.250	Mean of above	.251

Foot-candle horizontal illumination figures require very careful and impartial interpretation, because a reading of horizontal illumination is a factor both of the light falling upon a surface, and the nature of the surface itself, and must necessarily vary with a variation in either amount of light, or the nature of the surface upon which the light falls. For instance, if a perfectly white reflecting surface should be used, a higher reading must be obtained. Horizontal illumination can also be calculated theoretically, but no system has yet been devised which enables the light falling upon the ground, or illuminating vertical or other objects, to be measured. Thus, tests of this nature are like all figures, capable of unfair or biased interpretation. The results given above are, however, comparable and are not affected by these considerations, because all were obtained in the same way, by the same instruments and operators. The results show that the general illumination afforded by the gas lamps is higher than that afforded by the arcs.

The total length of road between the gas lamps is 321 feet, and between the arc lamps 363 feet; the preponderance of the former about compensates for the greater length of road lighted by the arc lamps. Apart from the photometrical tests two factors have to be taken into consideration in judging lights and lighting effects; those are diffusion and visual brightness. In both these qualities gas lighting by mantles has a very distinct superiority over any form of arc lighting yet desired. The gas lighted road has its light, therefore, more evenly distributed, although as shown below the candle power of the arc lamps is higher than that of the gas lamps. The light given by a gas mantle contains a larger percentage of useful light than that given by an arc lamp, and this explains why a street lighted by such high pressure gas lamps is so markedly well lighted; a feature, however, which cannot be measured and therefore cannot be expressed in precise terms. A test of candle power is, therefore, only one of several factors to be considered when comparing gas and arc lighting.

The results of the direct candle power readings are given below:

At 20° Below the Horizontal.

Gas lamp No. 1	22.45 candles.	Arc lamp No. 1	30.34 candles.
" " " 2	24.31 "	" " " 2	31.70 "
" " " 3	20.96 "	" " " 3	27.67 "
" " " 4	19.22 "	" " " 4	28.26 "
Mean of above	21.73 "	Mean of above	29.49 "

At 75° Below the Horizontal.

Gas lamp No. 1	16.13 candles.	Arc lamp No. 1	13.85 candles.
" " " 2	15.57 "	" " " 2	14.38 "
" " " 3	15.89 "	" " " 3	17.59 "
" " " 4	14.73 "	" " " 4	13.31 "
Mean of above	15.58 "	Mean of above	14.78 "

From careful observations and tests made it was ascertained that each gas lamp consumed 80 cubic feet of gas per hour.

It follows from these schedules that, taking the light found at an angle of 20°, the gas lamps in this case had only a mean efficiency of 27 candles per cubic foot. These gas lamps are not, therefore, in an efficient condition.

The details of the cost of the gas lamps, based upon the observations made of the gas consumption, and so on, and upon the estimates of the Municipal Gas Committee provided, are as follows:

Cost of gas uncompressed	$0	25.38	per	1,000	cubic feet.
Cost of compression	0	2.4	"	"	" "
Cost of gas compressed	0	27.78	"	"	" "
Mantles, each	0	27			

Wages.—Proportionate part of time of one man, whole time at $6.72, and another man 6 hours per week at $6, total $6.52. The mantles last 400 hours, therefore, each 3-burner lamp requires 15 mantles per annum, of 2,000 hours.

The cost per gas lamp per annum works out as follows on the data given above:

80c. cubic feet of gas by 2,000 hours=160,000 cubic feet at 27.78 cents per 1,000 cubic feet	$44.44
Lighting and extinguishing, cleaning and maintenance	6.52
Mantles, 15 at 27 cents each	4.05
Total per lamp per annum	$55.01

Nothing is included for interest and depreciation, on capital spent on installation or for globes. It should be noted that these gas lamps, if burning 4,000 hours per annum, would cost proportionately less per hour. The cost is not, however, given, because the lamps are all extinguished at 11 o'clock and, therefore, only burn 2,000 hours.

The capital spent on installing these 4 gas lamps is given below:

Wages	$59.16
Lamps	239.40
Poles	159.40
Suspension gear and rosettes	128.84
Barrels and fittings	9.88
Use of tower cart, team and labor and fixing poles	339.24
Total	$935.92

The charges of the gas committee given above are much higher per lamp than those made by the electricity committee for their 4-arc lights, and that places the gas lamps in a position of disadvantage.

The following comments are made on the figures given above. The cost of gas compression, taken at 2.4 cents per 1,000 feet as a result of observations of meters, is very high, owing to the fact the compressor is not worked at anything like its full capacity or load, which is 10,000 cubic feet of gas per hour. If it were, then the cost would be materially reduced, because the amount of current required to compress 10,000 cubic feet of gas is only 4 units, or .8 cent per 1,000 cubic feet. It has been pointed out above that the comparative test between the gas and arc lamps is vitiated by the abnormally low efficiency of the gas lamps; 2-burner lamps, fixed 13) feet apart, on 20-foot posts, should, under ordinary circumstances, give as good, if not better, light than the lamps dealt with above. From the pressure of gas with which the four lamps were supplied better results should have been obtained. This pressure is observed from a recorder fixed on the buildings before the flexible connections to the lamps, and it seems possible that the nature of the flexible connections is unsuitable and may be occasioning a loss of gas or pressure, possibly condensation, which no doubt accounts for the poor result obtained. It is also possible that the pressure and size of the burner nipples and air regulation are not adjusted so as to take advantage of the benefits of high pressure, these points being the essence of the high efficiency per cubic foot of gas which has generally hitherto been obtained. An efficiency of 27 candles per cubic foot of gas is an absurdity. Makers of high pressure lamps claim nominal efficiency of 60 candles per cubic foot, and with proper adjustment one can safely count upon 40 candles as an irreducible minimum, well within the average life of a mantle, with a maximum of from 50 to 55 candles per cubic foot.

During the tests the mantles of the burners were in good condition, but one of the lamps gave poor results, which, without new mantles being fitted, was greatly improved, that shows that while the arc lights were faultless during the test due to careful preliminary work and thought, the staff of the gas committee were not equally efficient and the test was not a reliable one. The efficiency of the arc lamps was accomplished by experiments and tests conducted over a long period, and the results obtained probably represent the maximum efficiency obtainable. Obviously the same preliminary work should have been undertaken by the gas engineering staff. It should also be noted that more perfect forms of high pressure lamps that those tested are now available. The gas lamps were also suspended at too great a height above the street. In the case of the arc lamps a height of 27 feet 6 inches was necessary on account of the glare occasioned by the use of clear globes; it was, therefore, assumed that it was also necessary to follow the same procedure in the case of the gas lamps. That was an obvious mistake; no case is known in which from consideration of the nature or volume of the light it is necessary to place a high power gas lamp more than 20 feet from the ground; there can be no doubt that if that had been done, an equal, if not better, illumination of the thoroughfare could have been obtained, covering a larger area per lamp from *two* burner lamps having an illuminating power of about 2,200 to 2,400 candles, giving a horizontal foot-candle illumination of 25 foot-candles and consuming not more than 50 to 55 feet of gas per hour.

The Evolution of the American Incandescent Inverted Gas Burner.

[Prepared for the JOURNAL, by MR. THOMAS J. LITLE, JR.]

Speaking entirely from the personal standpoint, I must frankly confess that, in its early stages, I was extremely dubious over the outcome of the inverted incandescent gas lamp situation in this country. The early experiments were made along the lines of the present type of goose-neck burner; that is, the mixture was made in the upright burners in use at that time. The mixture was then passed through a tube (bent through an arc of 180°) to the mantle on the free end of the tube. A great deal of im portance was attached to this construction on the start, for the reason that the gas adjustment and bunsen base were kept at a comparatively low temperature, consequently fresh, cool air would be entrained by the bunsen; but subsequent experiments proved that which was gained in this way was lost in the form of friction when the mixture was compelled to pass through this circuitous path in the curved goose-neck. Furthermore, it could never be hoped to produce artistic lighting effects with such a construction, so that at an early date my experimental work was confined almost enterely to the vertical type of inverted burner. A certain style of pendent fixture design had already been developed in electrical circles, and it was the most natural thing to follow along in the same path in designing the inverted gas fixture, to be equipped with the vertical tube type of inverted burner. As we are all familiar with this type of burner, I shall not dwell on it at any length, except to refer briefly to a number of cuts, as follows:

One of the original forms of goose-neck, inverted burners is shown in Fig. 1, and it may be noted that the burner-nozzle, which extends into the mantle, is made of metal. It was subsequently found that its life was short, as the metal tip would burn and the particles of scale would drop into the mantle, either breaking it or fusing with the mantle material. This type of burner was afterwards made with a magnesia tip instead of one of metal. As before stated, no artistic effect could be expected from such a construction. While there are a good many modifications of this type, I will pass to the vertical type of burner used extensively in this country. One of the early difficulties encountered was the persistent flashing-back of the burner upon ignition; but this was prevented by a device placed in the mixing chamber of the burner, and known as a thermostat. The thermostat is shown in Fig. 2 inclosed position, which would be its position before the burner was lighted. This thermostat introduces an impedance in the tube, preventing the normal flow of the mixture, and has the effect of reducing the air content in the mixture on ignition, with the result that the gas ignites very quietly and burns with a soft, blue, flame until the burner is heated, when the thermostatic impedance is automatically removed, as illustrated in detail in Fig. 3. Incidentally it may be remarked that the gas adjustment is made in rather a simple manner, also shown in Fig. 3, in which a vertically moving needle valve is inserted or withdrawn from the gas orifice by means of a horizontal screw, the head of which is insulated with fiber. I

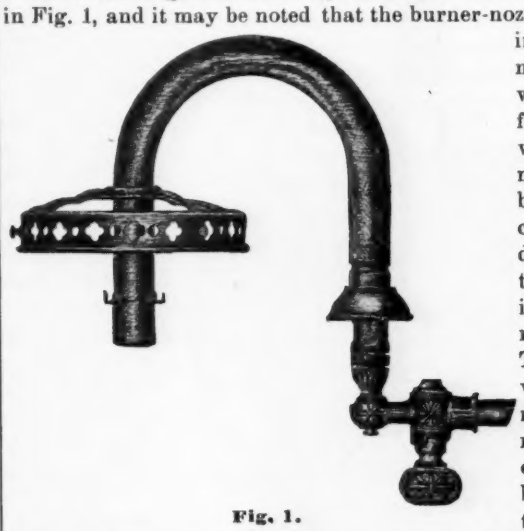

Fig. 1.

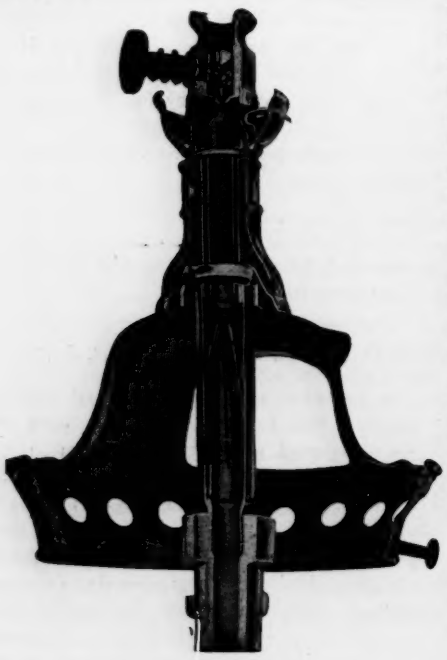

Fig. 2.

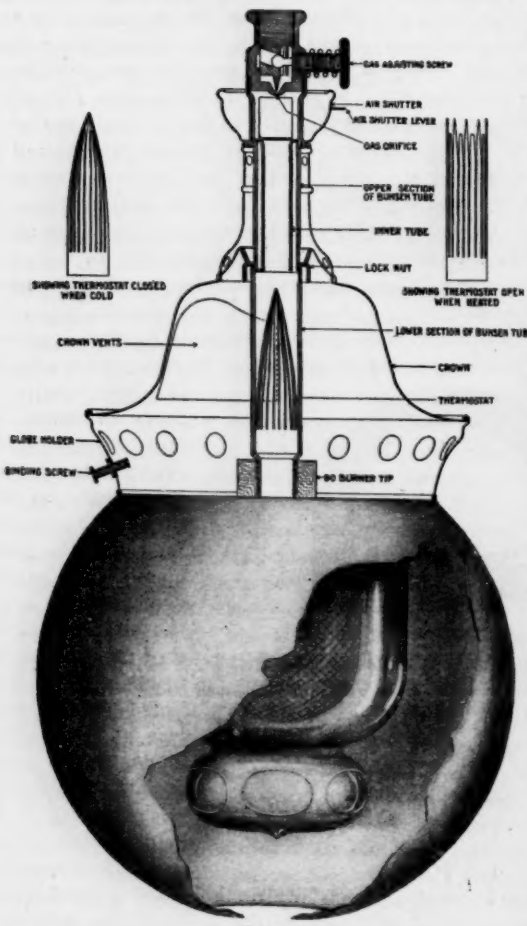

Fig. 3.

will also be noted that there is an inner cylinder or chimney surrounding the mantle, and while the air is taken in from below, the cylinder is designed in a way to prevent any particles of carbon that may form from becoming dislodged from the mantle and dropping to the floor. While this burner may appear very simple, it took several years to develop it to a point where it could be considered a commercial success. This burner with some slight modifications, is extensively sold at the present time.

It will be noted, on the 3 burners above mentioned, that the outer glassware was held in position by set screws, as was the case in all the popular forms of electric glassware holders. It was realized, however, that a great deal of unnecessary time was expended in running the screws outwardly in order to detach the glassware, so that a quickly detachable wire-holder was invented. The terminals of this wire are shown in Fig. 4. This burner is of the self-lighting type, being provided with a by-pass cock operated by chains.

At this point it may be mentioned that a great improvement has been made in the construction of the pilot tips, the present form of producing a semi-luminous flame, air being taken into the tip and mixed with the gas before it is burned, the construction being very similar to that of the acetylene burner. The advantages of the semi-luminous pilot tips are many:

First.—The flame being slightly aerated it does not tend to clog the mouth of the tip.

Second.—It is less likely to be extinguished by drafts.

Third.—Being semi-luminous the consumer is not apt to turn the flame to the vanishing point. A properly adjusted pilot flame burns from $\frac{1}{10}$ to $\frac{1}{12}$ cubic foot of gas per hour. It might be mentioned that some attention had to be paid to the production of a harmonious combination of gas burners and electric lamps when used on the same fixture. For that purpose various burners have been designed to closely resemble the electric socket. Fig. 5 shows such a burner On the other hand, a structure which closely resembled the gas

Fig. 4.

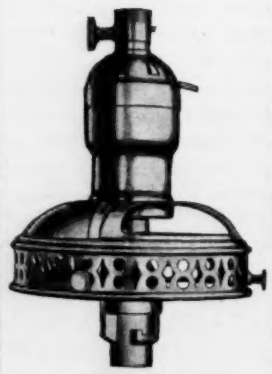

Fig. 5.

Fig. 6.

burner, was designed to contain an electric lamp, as shown in Fig. 6. Where both gas and electric lamps are used on the same fixture it certainly is reasonable to expect that some attention should be paid to harmonize the two illuminants with their accompanying glassware. It must not be looked upon from a narrow-minded standpoint with the fear that the gas man should protect his position by refusing to cater to the electric design.

A great many methods of igniting gas have been devised, the one by far the most popular being the pilot flame by-pass. A number of electric schemes were devised, using either a high tension jump-spark or a low tension make-and-break spark. The most promising means of electric ignition is the self contained fixture (shown in Fig. 7), in which a single dry cell supplies sufficient current to cause a small metallic filament, located in the crown of the burner, to glow to a dull red heat. By pulling the chain the gas is turned on, while at the same time electric contact is made in the body of the fixture. When the gas mixture comes in contact with the glowing metallic filament, a catalytic action ensues, causing the filament to instantly increase in temperature to the kindling point of the gas. The fixture is simple, and if ordinary care is used in shipping and installing, and if the battery is in good condition, very good results are obtained.

Stack Type of Burners.—It has been found that, in conjunction with a carefully designed bunsen tube, orifice, burner tip, etc., a properly constructed stack adds materially to the efficiency of the inverted gas burner, and a line of stack burners is now being marketed. The difficulty in placing a new product on the market is not necessarily in obtaining the highest possible efficiency, but also to so construct the burner that it shall not be too sensitive to slight gas changes when in service. A stack burner in which the outer case is finished in brushed brass and where the products of combustion do not come directly in contact with this brass shell, but pass up through an aluminized steel stack in the center (Fig. 8). Deflecting vanes in the top of the stack spread the products to one side. Fig. 9 shows an enameled steel stack, burner finished in white enamel with gold stripes; and while, by some, it might not be considered to harmonize with some of the expensive brass fixtures, it is certainly a sensible and durable burner. The burner shell when soiled may be washed with soap and water, the same as the glassware.

A miniature inverted unit, which consumes about 1.75 cubic feet of gas per hour, as seen in Fig. 10, is specially adapted to a number of locations in a residence where it is not only unnecessary, but extremely wasteful, to use a large burner, such as sleeping chambers, bath rooms, halls, etc. Furthermore, much more artistic results are obtained if several of these burners are used on a chandelier, obviating the one-sided effect obtained if only one large burner is lighted.

All these stack burners are highly efficient, frequently giving 30 candles or more per foot of gas.

High Power Inverted Unit.—The really most interesting development in gas lighting is the introduction of the large unit shown in Figs. 11 and 12, which lamp was designed to enable the gas man to meet the competition from the high power tungsten electric units. In

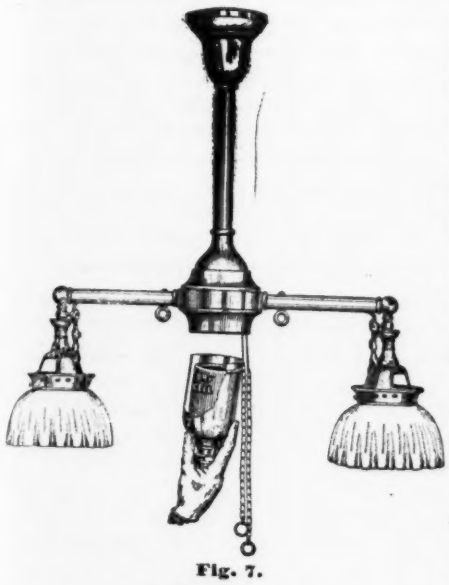

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

illumination it may be deemed as equivalent to a 400-watt tungsten lamp. In gas circles it will compete with the gas arc lamp. The light flux is approximately equal to a 3-burner gas arc; but the illuminating results obtained by the use of this lamp would seem superior to those from the inverted arc lamp for the following reasons:

First.—The lamp is equipped with an efficient reflector, such as used on the high power tungsten electric units, which direct the light at certain angles below the lamp where it is most needed. It is a well-known fact that more light is needed below the horizontal than either on the horizontal or above the horizontal in most commercial establishments. The reflector used on this lamp, however, does not direct the light into the useful angles below the horizontal by totally sacrificing the light on the horizontal or above it. There is still good horizontal illumination and plenty of light above the lamp to properly light the ceiling and to prevent that gloomy effect observed when metal reflectors are used. The mantle is similar to the standard inverted, except in size, its actual surface being about 2½ times as great. This unit embodies all of the highly efficient features of the "Reflexolier," equipped with scientifically designed reflecting glassware, and on the other hand, it is easier and cheaper to maintain than the gas arc. Broadly speaking, this high power unit embodies all of the best features of both the "Reflexolier" and inverted arc, and possesses none of their disadvantages. The lamp is equipped with a thermostat in the Bunsen tube to insure soft ignition. The gas adjustment is made by means of a plain, straight needle-valve, which can be readily unscrewed from the lamp for cleaning. The construction is so simple and the parts are so accessible that it is never necessary to take the lamp back to the shop for repairs. For instance, if the enameled case on the lamp should become injured, so that it became desirable to replace it, all that would be necessary to do would be to unscrew the lower section of Bunsen tube and slip another case in position, without unscrewing the lamp from its supporting gas pipe. Another great advantage of this large, high power unit is that all of the light from the mantle may be considered useful, it being unobstructed in any direction; whereas, in the case of the inverted arc, where several small mantles are clustered, the light from the inside

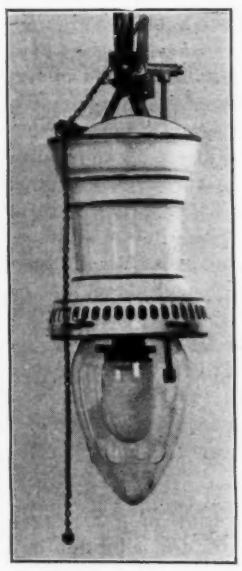

Fig. 11.

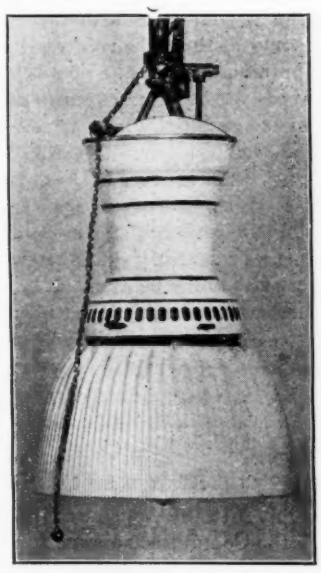

Fig. 12.

of the cluster is of course only partially available. The glass reflectors used on this high power unit are equipped with non-breakable metal neck. It is not considered good practice to use a glass neck reflector on this type of lamp. The labor cost in maintenance is still further reduced through the lamp being equipped with an automatic, quickly-detachable globe holder. That set screws for holding glassware are decidedly out of date in America is particularly true respecting the larger sized globes, for, where a globe is held by 3 or more screws, it has been repeatedly noted that the breakage frequently starts at the point of contact between the screw and the globe.

Great attention in the design of this lamp has been paid to the small details. For instance, the single chain operating the cock passes through a guiding eye so that it is impossible to pull it in any except the right direction. It cannot fly back and catch on some protruding part of the cock and make the lamp inoperative, which cannot be said of any other lamp employing a 1-chain pull in this country. These lamps consume from 9 to 10 cubic feet of gas per hour, and without reflector give 260 to 300 horizontal candle power. With an extensive holophane reflector the lamp will yield 520 to 600-candle power at 45° below the horizontal.

The advent of this burner places an entirely new phase on commercial lighting in this country. It has been particularly successful abroad and, without exception, every large gas lamp manufacturer in Europe is producing and selling this type of lamp. Aside from the standpoint of efficiency and easy maintenance, the price thereof will commend it to the purchaser, which price, largely due to its simple construction, leads me to believe that it is destined to become the keenest competitor that the electrical man has ever experienced.

Report of the Committee (Mr. W. J. Serrill, Chairman), on Utilization of Gas Appliances, Submitted at the Seventh Meeting, American Gas Institute,

Introduction.—Your Committee makes no apology for the length of this report. It believes the subjects discussed are of sufficient importance to the gas industry to warrant the members of the Institute in devoting to them considerable time and thought. The time is past when the gas engineer may study questions of manufacture and distribution exclusively; the all-important question of utilization may no longer be wisely left to the manufacturer of appliances, and to the commercial men of the gas companies. Many important engineering problems arise, and we doubt if the American Gas Institute can afford to sit complacently under the charge, frequently made, with what degree of justice we leave to the member to determine, that they take no interest in the appliance end of the business. If this report is in any degree helpful in awakening such an interest, the Committee feels that its work in the preparation of the report is amply justified.

This report contains a frank discussion of the design of different types of gas appliances and of the methods of connecting and using them. At the outset, the Committee warns the members of the Insti-

tute and anyone who reads this report, against the tendency to exaggerate any of the risks referred to, which may accompany the use of gas appliances when out of adjustment, or of gas appliances of certain types. Abundant experience has demonstrated the fact that it is safe to use gas appliances, whether for cooking, water heating, room heating, or lighting. Compared with the handling of appliances utilizing other sources of heat and light—coal, kerosene, gasoline, electricity—the use of gas appliances appears in a favorable light on the score of safety. The subject is here discussed in an effort to render this relatively safe practice still safer and to point out how possible risks may be avoided, as it is to the highest interest of the gas business to eliminate even improbable risks if possible.

J. C. D. Clark,
W. J. Clark,
G. D. Roper,
E. G. Van Wie,
W. J. Serrill, Chairman.

Section I.—Gas Range Specification.

Exhibit A in the Appendix contains a specification of gas ranges which the Committee submits for the approval of, and adoption by, the Institute at this meeting. The members of the Institute may remember that this Committee, in its report at the 1909 meeting of the Institute, said, "The advantages to both gas company and manufacturer, in the adoption of a standard design, which would be practically unchanged from season to season, are obvious. The objection sometimes raised, that the adoption of a standard will tend to discourage invention or improvement, the Committee does not consider to be a serious one, believing that it will not shut the door to any real improvement."

The specification now submitted is what may be called a "limiting" specification. It fixes certain minimum requirements in size, thickness, and weight of the various parts of gas ranges, and the kind or quality of the material entering into their construction; the manufacturer is free to increase these dimensions or weights or improve the quality as his interest dictates. The specification covers only those requirements which the Committee believes to be absolutely essential to the fulfillment of the purpose the Committee has in view. This purpose is to get the gas companies of the country into a position where they will supply to their consumers gas ranges which will combine reasonably high efficiency and long durability, with the quality of continuing to give satisfactory service with the minimum of attention. These requirements have not been set at any impracticable standard; the gas range the specification calls for is a medium weight, moderate cost, article.

The Committee is glad to announce that this specification is the result of the joint labors of this Committee and of a similar Committee of the National Commercial Gas Association. Several of the members of our Committee are also members of theirs. Our understanding is that it is the intention of that Committee to recommend to the National Commercial Gas Association, at its December meeting, the adoption of this same specification. Our Committee believes that the acceptance of the same specification by these two bodies is a consummation to be desired; it, therefore, recommends its adoption now.

It is possible that the future may develop gas cooking appliances along quite different lines from those on which the present gas range is built. The design of the electric cooker, on a basis that enables it to utilize practically every heat unit that is developed, may lead to the design of a gas range of a far higher degree of efficiency than anything that has heretofore been attempted. The policy that has controlled in the construction of gas ranges has been one in which the highest possible rate of efficiency was sacrificed to the production of a cooking appliance of relatively low first cost.

No criticism is here intended of the practice of the manufacturers of gas cooking appliances as a class. They have made what the industry has demanded, and have always been liberal in adopting changes.

The policy referred to has been amply justified in the wide extension and rapid growth of the practice of cooking by gas; it has brought the gas range within the reach of the poorest classes of consumers. The gas industry may, by the force of competition, be compelled to face in the other direction, and develop a more costly article that will, by means of better insulation, be more effective in conserving the energy evolved by the combustion of the gas. This question is still in the speculative stage, and it is the opinion of the Committee that it should not deter the Institute from the adoption of the specification now recommended.

It is not claimed that this specification as now drawn is perfect, or that no changes in it may prove to be desirable. Your committee thinks that any standard specification that is adopted by the Institute should be put in the charge of a special committee, whose duty it will be to correct errors, and consider changes in or additions to, the standard, presenting them from time-to-time for the approval of the Institute. To delay the adoption of a standard until perfection was assured, would mean to delay it indefinitely. There are manifest advantages in the course here proposed, and your Committee recommends the adoption of this specification, and the appointment of a Committee to father it.[1]

EXHIBIT A.—PROPOSED GAS RANGE SPECIFICATIONS.

(1) *Sheet Metal.*—No part made of sheet metal to be less than No. 24 gauge (U. S. Standard), except rack supports. Heavier metal may be used where specified. No galvanized iron to be used, except for burner bases, bottom parts of range bottoms, dip pans, bottoms of elevated broiling ovens or linings, when so ordered.

(2) *Body.*—The parts, tops and leg bases (excepting leg bases of cabinet and elevated oven ranges with skeleton bases), to be of cast iron; or, if made of sheet steel, the metal to be not less than No. 18 gauge (U. S. Standard). Where the leg base is used, it is to extend around the ranges, and if made of cast iron to be of one piece construction. The supporting frame of cabinet ranges to be made and shipped as one piece, and to be of sufficient strength to prevent bending or sagging under any conditions. All four edges of the sheet steel bottom shelf, under any range, to be so formed or reinforced for their full length that buckling under any conditions would be prevented. This reinforcement preferable to be of one piece construction.

Oven Dimensions[2]—Standard 18-Inch Ranges.

Single Oven Type.	Height, Inches.	Width and Depth.
Where a broiling burner is used in this type of stove, the clearance under the burner to be not less than 10 inches.	11—12 preferred	
Double Oven Type.		
Broiler	8½	A standard minimum
Baker	11—12 preferred	
Elevated Oven Type.		width and depth of
Where both a broiler and baker are above cooking top.		18-inches is recom-
Broiler	5	mended for all types.
Baker	11—12 preferred	
Where one oven is above and one oven below cooking top.		
Broiler	8½	
Baker	11—12 preferred	
Side Cabinet Type.		
Broiler	8½	
Baker	11—12 preferred	

Linings to provide air space insulation to the ovens at sides and back. Where used for insulation solely, there is to be not less than ¼-inch nor more than ½-inch dead air space. Where the back space is used for both insultation and flue purposes, there is to be not less than ¼ inch nor more than 1 inch space. Linings to be easily removable and to be held in place without bolts or clips. Bolt holes in castings to be circular and not slots. The sub-top or burner box to be of cast iron or of sheet metal so treated as to effectually withstand corrosion.[3] The sub-top or burner box is to be turned up to meet the main top and to be easily removable for repairs.

(4) *Oven Tops.*—The outside part of the tops of baking ovens on elevated and cabinet types of ranges, if of sheet steel, to be not less than No. 18 gauge (U. S. Standard). The inside part of these tops to follow the regular construction of ranges of the standard double oven type. The tops of separate elevated broiling ovens to be made in two parts. The inside part to be made of not less than No. 18 gauge (U. S. Standard) sheet steel, and perforated, to allow the products from

[1. Exhibit A., in Appendix, is here brought forward to show in regular sequence with the initial findings of the Committee.—Eds.]

2. All dimensions are minimum and given in the clear. This does not include auxiliary ovens.

3. Sheet metal is understood to effectnally withstand corrsion for the purpose of this clause of the Specification, if it fulfills the requiremeits prescribed in the test which appears in the appendex of this Specification under the title "Exhibit A."

the burners to escape through it. The outside part to be made of two pieces not less than ¼ inch nor more than ½ inch apart, and properly insulated—dead air space insulation preferred.

If any other insulating material is used, it is not to be exposed, and must be tightly enough packed to keep it from shifting and giving uneven protection. The inside sheet of the outside part to be made of No. 18 gauge (U. S. Standard) sheet steel, while the outside sheet may be either cast iron or not less than No. 18 gauge (U. S. Standard) sheet steel. (Cast iron preferred.) This outside part to be bolted together and handled as one piece.

(5) *Oven Bottoms.*—Bottoms of baking ovens to be of cast iron or sheet steel. When made of sheet steel, and insulated, the bottom is to be double and the insulation is not to be exposed, and is to be so placed that it will not shift. The sheet metal to be used in the upper part of the oven bottom to be not less than No. 22 gauge (U. S. Standard), and the lower part to be not less than No. 18 gauge (U. S. Standard). When not insulated, but the open space between the sheets used for circulation, both sheets to be of No. 18 gauge (U.S.Standard).

(6) *Range Bottoms.*—Bottoms under oven burners in the single oven type of range, bottoms of broiling ovens in the double oven type, and bottoms of lower ovens in the elevated oven type to be made so that the temperature as shown on a blackened bulb thermometer laid on the floor under the range will not exceed 120° F. in 40 minutes with both oven burners burning at maximum consumption. Where a separate leg-base is used, the oven bottom to be constructed as a removable part, and to be readily removable as one piece. Bottoms of elevated ovens on the elevated oven type of range when exposed to the products of combustion of the top burners to be air tight, bolted in place and to be either of cast iron or sheet steel. Where sheet metal is used, it is to be so treated as to effectually withstand corrosion.[1]

(7) *Rack Supports.*—Rack supports to be made of channel construction to prevent racks from tilting when partially withdrawn. One support to be placed so that the bottom rack in the baking oven is 1¼ inches above the oven bottom; another support to be placed midway between the lower support and the oven top; the other supports to be appropriately spaced. In broiling ovens, the supports to be as close together as possible throughout the height of the oven.

(8) *Flues.*—The flue collar to be of cast iron. The collar for flue connection to fit a standard 4-inch flue pipe, and to have a $\frac{3}{16}$-inch chain-hole for pin to hold flue pipe. Collar for flue connection to be on the top of the range, so ventilated that the placing of a vessel over the collar will not prevent the oven products from escaping. The outlet for flue connection on canopies to be round, of such a size as to fit a 6-inch flue-pipe and to have a $\frac{3}{16}$-inch chain-hole for pin to hold flue-pipe. The bottom of flue or flue box, on which condensation from the products of combustion or vapors from cooking may collect, to be made of cast iron or No. 18 gauge (U.S. Standard) sheet metal. In the elevated oven and cabinet types, the products of combustion from the oven burners must be discharged directly into the flue of the stove.

(9) *Doors.*—Swing doors, to be hung on pins, preferably set in the door lugs when same are cast; tops of lugs to have a smooth finish, or, if loose pins are used, the lower end of pin is to be split, so that it may be spread to prevent accidental displacement; door catches to be so designed that any pressure on the door from within the oven will cause it to open. In the single, double, and elevated oven types, when swing doors are used, the hinges are to be placed on the side of the range opposite to the oven burner cocks. In the cabinet type, swing doors when used are not to open toward the cooking top. Drop doors, when over 6 inches in height, to have a spring or a counterbalance. Baking oven doors either to be insulated or, when made of cast iron, to have a smooth inside surface coated with aluminum paint or some equally satisfactory heat reflecting coating. Broiling ovens to be so ventilated as to admit an ample supply of air to the broiling oven, and it should be possible to observe the burner flame without opening the door.

(10) *Legs.*—Legs to be of such a height that there will be a clearance of not less than 2½ inches between any part of range body or base frame and floor. When separate base frame is used, the legs to be detachable and interchangeable.

(11) *Oven Burner Plates.*—Oven burner plates to be so assembled as to make a close fitting joint with the lining and with the burners, so that there will be no loss of heat or escape of products of combustion through openings at these points.

1. Sheet metal is understood to effectually withstand corrosion for the purpose of this clause of the specification, if it fulfills the requirements prescribed in the test which appears in the appendix of this specification under title "Exhibit A."

(12) *Bolts.*—No bolts or screws to be used except those having standard stove bolt threads. Door linings, knobs, handles and name plates to be attached by through bolts with nuts and not by rivets. The bolts and nuts holding the knob or handle and name plate on the door to be accessible without the removal of the door lining, if more than 4 bolts are used to attach lining. No bolts smaller than $\frac{3}{16}$-inch to be used.

(13) *Top Grates.*—Top surface to be raised slightly above the level of the main top; edges to be gradually bevelled to where they meet the main top, so that a vessel will slide on or off without jar. Top grates to be interchangeable, two pieces preferred. Openings in top for grates to be as large as practical, especially from front to rear.

(14) *Top Slide Shelves.*—To be interchangeable.

(15) *Top Burners.*—Burners to be cored castings, and not to have any loose parts. This applies to simmering as well as to other burners. The gas outlets to be drilled ports. No cone-spreader to be used. Top burners not to be bolted to their supports, unless the supports lift out with the burners, No supports to be bolted to range. Supports to be interchangeable. The supports to be such as will keep the burners permanently at even distance below the top grates. The distance between the tops of burners and the bottom of a vessel placed on the top grates to be not less than 1¼-inch. The simmering burner to be so located that its combustion will not be hindered by, nor interfere with, the combustion of any other burner. The simmering burner is preferably to be located on the side of cooking top.

(16) *Oven Burners.*—To be easily removable, not to be bolted or locked into their supports by any means, and to be arranged so that they positively cannot be inserted upside down (this clause does not preclude the use of any temporary fastening to prevent displacement in shipping). The gas outlets to be drilled ports. Oven burner supports to be of rigid construction, to be bolted to rack support or oven lining, and not to range body. Provision to be made for the observation of the burner, in single oven ranges, without opening the door.

(17) *Oven Pilot Lighters.*—No device or method shall be used for lighting the oven burners, except one that ignites these burners instantly at any working pressure and under all service conditions, and which will in no way interfere with the combustion of the oven burners.

(18) *Air Mixers.*—Air mixers for top and oven burners to have flat faces smoothly finished so as to prevent leakage of air, and fitted with flat-faced, close fitting shutters, to be attached by $\frac{3}{16}$-inch stove bolts.

(19) *Air Shutters.*—Shutters of all burners to be so constructed as to permit of at least five adjustments—*i. e.*, full opening, full closure and three intermediate positions; to be so designed as to prevent slipping of the air shutter. The shutters themselves to be of substantial cast or malleable iron, or not less than No. 20 gauge (U. S. Standard) sheet steel, and if of steel the edge to be turned over. Shutters for top burners, and sheet steel shutters for oven burners, to be nickel-plated.

(20) *Cocks and Valves.*—Ranges are to be equipped with either lever-handled cocks or wheel-handled valves, as ordered. Cocks and valves are to be tested and required to remain tight and free from leaks under a pressure of 3 pounds per square inch.

Cocks.—The Committee is not prepared to recommend at this time any one type of cock to be adopted as a standard. It has the matter under consideration, and hopes to be able to develop a cock that will be suitable for general adoption.

Valves.—As in the case of cocks, the Committee is not prepared to recommend any one type of valve to be adopted as a standard at the present time. A one-piece valve is believed to be satisfactory, and in the Committee's judgment is to be preferred, but no definite specification will be proposed until the Committee has had an opportunity to consider the matter at greater length.

(21) *Gas Rails.*—Gas rails to be not less than ¾ inch, extra heavy, wrought iron pipe, and all ends to be carefully reamed on the inside to remove the obstruction or burr caused by cutting. Gas rails not to be constructed of bent pipe. Rail supports to be of split type instead of solid pattern. To be two supports of the oven rail. Oven rail supports to be so designed that, by removing caps from them, the rail may be swung outward. The riser from the oven rail to be located at the back of the range. The entire manifold assembled to be tight and free from leaks when subjected to a pressure of 3 pounds per square inch.

(22) *Drip Pans.*—Drip pans under the top burners to be galvanized or covered with an approved form of protective covering; to have the 4 edges turned up and the corners made tight; to be of ample length,

(*Continued on page* 362.)

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NEW YORK, MONDAY, DECEMBER 2, 1912.

[OFFICIAL.]

National Commercial Gas Association.

OFFICE OF SECRETARY,
NEW YORK CITY, Nov. 29, 1912.

To the Members of the National Commercial Gas Association: The Eighth Annual Convention and Exhibition of Gas Appliances of the Association will be held in the Auditorium Armory, Gilmer and Courtland streets, Atlanta, Ga., December 2d to 7th, 1912.

Registration.—A temporary registration booth will be opened at the Headquarters, in the Georgian Terrace Hotel, on Sunday, December 1st. Registration will continue at the Auditorium Armory, Monday, December 2d. The Exhibition of Appliances will be open for private inspection of the members and their guests on Monday.

Business Sessions.—The opening, and all subsequent, business sessions of the convention will be held in the Convention Hall, located in the Auditorium Armory, beginning Tuesday morning, December 3d, at 10 A.M.

PAPERS.

Monday, A.M.—Address of welcome, reports of the Board of Direcors, President, Treasurer, Secretary, and Committees, election of new officers, etc.:

Tuesday, P.M.—"Gratuitous Work for Consumers, the Reasons, Precautions and Its Remedies," by Mr. E. C. Weisgerber, General Manager Cedar Rapids Gas Company, Cedar Rapids, Ia.

"The Sale of Gas for Illumination," by Mr. R. F. Pierce, Illuminating Engineer, Welsbach Company.

Wednesday, P.M.—"Artificial Gas for House Heating and its Possibilities," by Mr. A. F. Krippner, Industrial Engineer, Laclede Gas Lt. Co., St. Louis, Mo.

"Industrial Fuel as a Revenue Producer and Methods for Development of Large Consumers," by Mr. John S. Welch and the Industrial Division of the Philadelphia Gas Works.

Thursday, P.M.—"Efficiency in the Advertising Department," by Mr. E. St. Elmo Lewis, Detroit, Mich.

"Sales Campaigns," by Mr. James P. Hanlon, Public Service Gas Company, Newark, N. J.

Friday, P.M.—"Education of the Employees," by Dr. Lee Galloway, New York University, New York City.

"Public Service," by C. E. Paige, Tenney Syndicate, Boston, Mass.

ENTERTAINMENT FEATURES.

Monday Evening, December 2d.—Informal Reception and Buffet Supper, to be given by Mr. P. S. Arkwright, of the Atlanta Gas Light Company, at the Piedmont Driving Club.

Wednesday Evening, December 4th.—Theater party, Grand Opera House.

Friday Evening, December 6th.—Beefsteak dinner, Taft Hall, Armory.

Saturday Afternoon, 12:30.—Georgia barbecue at the Park avenue entrance of Grant's Park.

Entertainment coupon books—gentlemen, $7.50; ladies, $2.50.

Respectfully, LOUIS STOTZ, Secretary.

BRIEFLY TOLD.

INSPECT THE EXHIBITS.—Every gas man, be he engineer-in-chief, commercial engineer (?) advertising manager, or merely chief of the appliance department, seller of gas, or seller of wares, through, from or by which gas is consumed, who will be present at the Atlanta (Ga.) meeting of the National Commercial Gas Association, should consider it a bounden duty to inspect, in detail and at length, the many things that have been temporarily transported to Atlanta for his inspection. These exhibits have been shipped, set up, and will be manned, at a cost to each of the exhibitors that would cause the owners of many a small gas company to look aghast at the suggestion of its superintendent that an equal sum could be advantageously expended in main extensions, or in kindred way. It is beyond doubt that this Atlanta show will exceed anything that the Association has hitherto brought off, save possibly in New York and Boston, and it is not far from being a certainty that Atlanta will compare well with both. In any or all event, the exhibitors are there, and while barbecues, dances, fraternizings and all that sort of matter are not only forgivable, but are to be taken advantage of to the full, it nevertheless remains the fact that those who own the farm should be permitted some return from the crops raised by the tiller. The manufacturers of gas appliances, not to put too fine a point upon it, are the ones who have made the National Commercial Gas Association a success, and it is asking small consideration from those who, at their respective Company's disbursement, attend the Atlanta sessions, that the business times thereof are the times when their Companies are to receive at least a good interest on their transportation investment, to say nothing of the housing charge, gained by knowledge of that which is best on the market to further develop sales of gas. Manager Congdon and his efficient Commercial Manager—Mr. J. C. Rushin—may be counted on to do the entertaining honors in Atlanta as they should be done, for both are past-and-present masters of the band who know how to meet guests and how to treat them. We have the further exceeding satisfaction of knowing that the attendance from the East will be of the plenary sort, a fact which we believe will be the greatest compliment the East may pay to hosts expectant.

CURRENT MENTION—

LAST week we credited the article on "The Overreading of a Gas Meter: A Case in Point," to Mr. Alfred F. King. The author should have been given as Mr. Alfred F. Krug, who is Superintendent of the Baltimore Company's Commercial Department.

MR. W. E. HARTMAN has resigned the position of Engineer-in-Chief, of the H. Koppers Company. Other changes in the personnel of the executives of the corporation show that the staff is now thus composed: President, H. Koppers; Vice-President and General Manager, James C. McMath; Second Vice-President, Thomas V. Salt; Chief Engineer, Allen Strale; Secretary and Treasurer, Joseph M. Butler.

THROUGH the courtesy of Mr Charles Potts, Secretary-Treasurer, the Philadelphia Gas Works Section, N. C. G. A., we are enabled to publish the following: The annual meeting of the Philadelphia Gas Works Section of the National Commercial Gas Association was held Tuesday evening, November 26, in the Parkway Building, Broad and Cherry streets, Philadelphia. The terms of the officers of the past year expired with this meeting and an election for their successors was accordingly held. By unanimous vote these choices were made: Mr. Thomas R. Elcock, Jr., Advertising Manager, The United Gas Improvement Company, President; Mr. S. H. Thompson, Vice-President; Mr. Charles Potts, Secretary-Treasurer; and Mr. W. P. Bailey and W. J. Hibbs, were elected to positions on the Executive Committee. President Myers, in retiring, briefly summarized the work accomplished by the Association during the year, among other things mentioning the growth in membership from 250 to 838. As a token of Mr. Myers' able services, he was presented with an "Efficiency Badge," which he acknowledged with his usual characteristic modesty. Mr. Elcock, in a very pointed address, thanked the members for his election and briefly set forth the policies to which he would endeavor to adhere during his administration. As previously arranged, this meeting was to be in charge of the Commercial Department, and President Myers accordingly called upon Mr. Thomas H. Jackson, General Agent, to take the Chair. After a few preliminary remarks Mr. Jackson introduced Mr. S. H. Thompson, who presented a paper on "Service and Co-operation." Mr. George Hergesheimer, who was next called, read a paper on "Orders and Complaints," and Mr. Keas followed with a story of some "High Bill Complaints," which was followed by one on "Credits," by Mr. Chas. Conard. All

of these gentlemen are connected with the Commercial Department and their excellent papers set forth very fully the system followed therein so far as it related to the subjects concerning their papers. The separate numbers were received with applause and considerable helpful discussion followed. The past year of the Association has been a profitable one under the guidance of Mr. Myers, and with Mr. Elcock at the helm, there is every reason to believe that 1913 will be one of notable achievements.

A CORRESPONDENT in Philadelphia, Pa., writing under date of the 26th ult., informs us that the United Gas Improvement Company has entered suit, in the Northern Ohio District, United States District Court, for an infringement of Letters Patent controlled by plaintiff, covering the use of devices for the measurement of air and steam to a water gas setting. The Bill of Complaint narrates that the United Gas Improvement Company was the original and true inventor of certain new and useful improvements in water gas apparatus in this country, or any foreign country, prior to the application of Letters Patent, which latter were issued in 1907. The Bill further recites that large numbers of devices have been sold and installed by the complaining Company, and that the public in general (the defendant in particular) have been notified respecting the said Letters Patent; but that, in total disregard of such notice, it is now manufacturing, selling and using water gas apparatus made according to, and embodying the inventions and improvements set forth in the said Letter Patent, and in violation and infringement thereof; and an injunction is asked restraining the said defendant from any further manufacture, sale or use of the devices made in accordance with, or containing the improvements or inventions set forth in the patents, and that it be compelled to account for them, by paying over any profits it may have received from the sale of such appliances, and damages sustained by reason of such infringement.

A FRIEND of ours, writing from Boston, Mass., under date of the 26th November, reports:

Dear JOURNAL: "Our mutual friend and fellow-worker, Fred. K. Wells, was in propinquity to the Hub some days ago, for I had the pleasure of listening to a 'talk' by him in Revere, Mass., before the Local Employees' Association of the Suburban Gas and Electric Company, of Revere. The occasion was notable for two classy papers, on a joint theme, respectively, by Mr. James Mann, foreman of the gas department, and by Mr. J. Steinberg, the storekeeper, the joint theme being, 'Co Operation in the Tenney Service'—the Suburban division is one of the 'star' plants of the Tenney Corporation. The meeting was preceded by a supper, cooked by the Association's members, on gas stoves, of course. The service (and excellent it was) was also rendered by the men, and everything was in order; and good order, too. The technical proceedings followed the supper, and the papers gave rise to discussions that interestingly held the close attention of the 50 or over present until 11 o'clock. Manager Chisholm is certainly a live wire, and beyond that he is assuredly well-esteemed by his men. Further, the Gas Employees' Association is doing and will continue to do, good work."

THE Gas Machinery Company, of Cleveland, O., has engaged to place sectional silica retorts and settings for Waterloo, Ia.; Painesville, O.; and Kingston, N. Y. The installation of 5 benches arranged for Waterloo is the third one of the silica type ordered for the named place.

ARTICLES incorporating the Richmond Radiator Company, of New York City, to deal in gas and steam radiators, with a capital of $427,500. The incorporators are Jos. A. Bennett, Robt. S. Struck and R. S. Aldrich, of New York; and H. W. Davis, of Wilmington.

THE New Jersey Board of Public Utility Commissioners has issued an order decreeing that the New Jersey Gas Company supply gas to its customers in Woodstown and Elmer, at a maximum charge of $1.50 per 1,000 cubic feet, with a discount of 8 per cent. on accounts paid within 15 days.

BOOK REVIEWS.

"*Carbonization of Coal.*"—A scientific review of the formation and composition and the relation of these to the destructive distillation of coal for gas, coke and by-products; by Vivian B. Lewes, Professor of Chemistry, Royal Naval College, and chief gas examiner. City of London, England. Over 325 pages, including 27 illustrations, Published by Messrs. John Allan and Company. For sale by A. M. Callender & Co., AMERICAN GAS LIGHT JOURNAL. Price, $3.

Prof. Lewes stands in no need at our hands of an introduction to the gas fraternity. This (his latest work) is based largely upon his "Cantor Lectures," 1911. The preface states that the advances in the carbonization in the early years of this century will rank as remarkable as those of a corresponding period in the last. Surely, a bold and broad statement, but of a kind which befits one interested and active for the past 40 years, and not afraid to prophesy, even if all of the predictions are not fulfilled. This work is similar to his former effort, "Liquid Fuels," inasmuch as it covers the field quite thoroughly, giving the physical characteristics of the material, and in sequence notes the various methods in use for its distillation, coupled with the results obtained by a number observers. By-products are included, as also a number of valuable tables for reference.

Publications.

[All Publications, Catalogues, etc., mentioned below, are kept in our office for the convenience of our patrons.]

"*Lighting Data.*"—Readable and valuable data, for salesman and engineers placing gas arc lamps in service, will be found in a recent catalogue of data sheets on "Beau Ideal Gas Arcs," issued by the National Gas Light Company, and furnished upon request.

"*Water Heater Construction.*"—Forceful and convincing arguments concerning the construction of the 1913 Pittsburgh water heater, are well displayed in an attractive poster circular; 32 by 22 inches. Asks for a place on the Pittsburgh's mailing list.

"*Liquid Fuel Equipment.*"—A catalogue compiled by Mr. W. N. Best, to show the various methods of using compressed air or dry steam in burning fuel oil, crude oil or tar in various types of boilers.

"*Advertising Electrotypes.*"—Stock electrotypes which have been used successfully in connection with "Reflex" campaigns, are illustrated in "ad." book issued by the Welsbach Company.

"*Cutting and Threading Machine.*"—The Forbes pipe cutting and threading machinery is well described in the 14th Edition of the Curtis & Curtis Company's catalogue.

"*Pittsburgh.*"—The Chamber of Commerce, Pittsbugh, Pa., has issued a pamphlet covering the advantages of that thriving city. The civic and business activities are well illustrated, and the whole does credit to its creators and to the printers. Copies can be obtained from the Riter-Conley Manufacturing Company.

"*Steam Flow Meter.*"—Revised data is given in "General Electric Bulletin," A-4004, on the General Electric Company's steam flow meter.

"*Lindsay Lamps.*"—Catalogue No. 12 of the Lindsay Light Company covers its various mantles, lamps, glassware and accessories.

"*Veeder Counters.*"—The various products of the Veeder Mfg. Company, including cyclometers, odometers, tachometers, tachodometers and counters are fully described in a recent catalogue.

"*Iowa Industrial Conditions.*—Bulletin No. 27, Iowa State College, contains a study of Iowa population as related to industrial conditions, by Mr. J. E. Brindley. The report covers 65 pages, and the first conclusion presented states that a complete system of industrial education is a necessity. We believe that, should similar investigation be made in our industry, the conclusions would be similar.

"*Lead Rope.*"—Pamphlet describing methods of preparing lead wool, in spools of rope, and its various applications for use of gas fitters, plumbers and steam fitters. United Lead Company.

"*Atmospheric Burners.*"—The Johnson direct jet gas burners and several other industrial appliances are described in a booklet issued by the Johnson Gas Appliance Company.

"*Pipe Bulletins.*"—A number of technical and other bulletins, issued by the National Tube Company, are listed in Bulletin No. 11.

"*Educational and Welfare Work.*"—The aims and plans of the New York Edison Company in educational and welfare work among its employees, are described in detail in a pamphlet which should prove valuable to those interested in employees associations, etc.

"*Southern Gas Association.*"—The 1912 Proceedings, Fourth Annual Meeting, Southern Gas Association have been published in a book numbering 270 pages. The registration, papers and discussions at the meeting, membership list and portrait of President Hoyt are included.

"*Southwestern Electrical and Gas Association.*"—The 1910 Proceedings, Sixth Annual Convention, are now available in book form. The permanent Secretary (Mr. H. S. Cooper) informs us that the 1911 and 1912 "Proceedings" will follow shortly.

(*Continued from page 359.*)

breadth and depth to catch and contain anything spilled through the top grates; not to bind on the sides of the burner box, and to have convenient hand hold; all edges of pan and hand hold to be smooth.

(23) *Oven Racks.*—To be 2 oven racks of light, strong and durable construction. Oven racks and broiling pans to lie perfectly flat and not to bind against the rack supports either before or after the oven is heated.

(24) *Elevated Ranges.*—Air supply to elevated ovens to be taken in at back or sides, so as to avoid as far as possible the drawing in of products from the top burners.

(25) *Cabinet Ranges.*—If any pipe or connection is placed below the supporting frame of the range, it is to be so placed as to be protected from injury during shipment or installation. Provision is to be made on these ranges for connection at either end.

EXHIBIT "A" OF GAS RANGE SPECIFICATIONS.

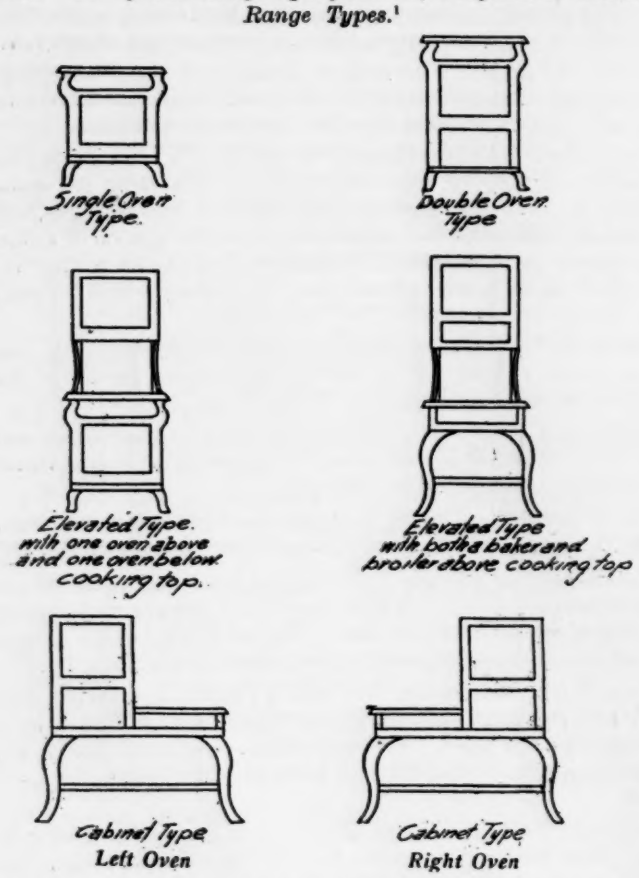
Sheet Metals to be Considered Suitable for use under the Provisions of Clause 2 and Clause 6 of the Accompanying Specification must Satisfactorily meet the Following Requirements:

1. A piece of the metal to be tested, about 4 inches square, is first placed in an oven and brought to a temperature of 500° F. If at this temperature, and after cooling, it shows no sign of softening, flaking or other deterioration, it is to be cleaned with petroleum ether, then thoroughly washed with water and dried, to remove all adhering grease and dust, which might interfere with the action of the reagent to be used, and then subjected to either of the tests described below, according to the kind of metal.

2. *For Galvanized Sheet Metal, the Test is as Follows.*—About 10 drops of the copper sulphate solution (described in paragraph 4) are placed in the center of the test piece of metal. The solution is quickly washed off after 20 seconds. Repeat this, placing the solution on the same spot as before, and keep repeating the test until the test piece has been exposed to the action of the solution for 150 seconds. If no bright deposit of copper, which cannot be removed by washing and rubbing with a rag or piece of waste, has been formed, the material is to be considered satisfactory, for the purpose of this specification.

EXHIBIT "B." GAS RANGE SPECIFICATIONS.

Exhibit "B." of Gas Range Specifications, Diagram of Standard Range Types.[1]


Single Oven Type.
Double Oven Type
Elevated Type. with one oven above and one oven below cooking top.
Elevated Type with both a baker and broiler above cooking top
Cabinet Type Left Oven
Cabinet Type Right Oven

1. The purpose of this diagram is to define the types referren to in the accompanying specification,

3. *For Coated or Chemically Treated Sheet Metal, the Test is as Follows.*—About 20 drops of the copper sulphate solution (described in paragraph 4) are placed in the center of the test piece. After a 10 minute exposure, it is quickly washed off and dried. If, after repeating this operation three times, no copper deposit is noticeable the material is to be considered satisfactory for the purpose of this specification.

4. *Copper Sulphate Solution.*—The copper sulphate solution is prepared by dissolving 36 parts (by weight) of commercial copper sulphate in 100 parts (by weight) of water. To this solution, an excess of chemically pure cupric oxide is added, and after being shaken and allowed to stand for 10 hours the undissolved excess of cupric oxide is filtered off. The remaining solution is used as described above.

(To be Continued.)

Text of the Decision, Natick Residents' Petition to Massachusetts Board of Gas and Electric Light Commissioners, for a Reduction in Lighting Rates.

The following is the text of the decision, in respect of the matters named in the heading:

This is a complaint under section 34, of chapter 121, of the Revised Laws, by more than 20 customers, against the Natick Gas Light Company, praying for an improvement in quality and reduction in price.

The public hearing required by law was held in Natick, at which the petitioners were represented by a committee of the Natick Commercial Club and the Company by certain of its officers.

Complaints were submitted at the hearing by numerous customers residing in different sections of the town that the gas was poor. Upon investigation it appears that, while the gas with rare exceptions has been above the legal standard of candle power, the supply has been inadequate, with the result that many consumers have been unable to obtain the quality of light or heat to which they were entitled. While this difficulty was due in part to an unusual accident at the works, which for a short time interfered with the normal ability of the Company to supply, it was principally caused by faults in the construction of the distribution system, which have since been remedied.

So far as the Board has been able to ascertain, the causes of the difficulties described at the hearing have been removed, and no order against the Company relative thereto appears to be necessary. If they shall reappear in any part of the Company's system, they will doubtless be due to local causes only. The Board, whenever advised of the Company's failure to remedy such condition after complaint, will be prepared to give such case its immediate attention.

This Company was organized in 1873 for the purpose of supplying illuminating gas in the town of Natick, and was ready to supply gas about 2 years later. The population of Natick, which at that time was about 6,500, has since increased to nearly 10,000. Since its organization the ownership of the Company has changed several times, but until recently none of the various groups holding control have managed it successfully.

In reviewing its affairs, in a decision upon a similar complaint in 1906, when the maximum net price was fixed at $1.75, the Board made the following statement:

This Company is to be classed with the smaller companies in the State, having annual sales of 10,000,000 feet. It is within the territory of the Edison Illuminating Company, of Boston, and sells its gas in competition with the supply of electric light by that Company. Its profits have never been extravagant, and its dividends have been low. It has never paid more than 6 per cent., oftener only 5. For a series of years it paid no dividends, and has recently been paying only 4 per cent.

In this decision, after some comparison of the abilities of such a Company with others much larger, the Board further said:

These facts make it practically impossible for the smallesr company to supply as cheaply as the larger one. Such conditions, however, stimulate the smaller company to the greatest practicable economy in all its operations, a conservative policy respecting its capital charge, and a steady endeavor to increase its output by a reduction in price as often as the profits will allow the assumption of the risk which may be incident to such reduction. Such a policy, steadily pursued, we believe will produce the most equitable and most satisfactory results both for the company and its customers.

For many pears prior to 1900 this Company maintained a differential rate for the larger consumers only slightly below the maximum net. In that year, with a maximum net rate of $1.90 for gas for lighting, a special net rate of $1.50 was made for power and cooking purposes.

The reason for this action lay apparently in the desire of the management at that time to make a more attractive and practicable rate for those who might desire to use gas for cooking or manufacturing purposes, with the hope of increasing the Company's output and of making it possible, through the reduction in average costs thereby secured, to reduce the maximum net price. As a result of this policy the sales at the $1.50 rate, which in the first year after its adoption were slightly over 1,500,000 feet, had increased in the year 1910 to 7,500,000, which was more than 50 per cent. of the entire output. In fact, practically the only increase in sales during that period was at the $1.50 rate.

Following the suggestion in the Board's decision, already referred to, and aided by the increased sales, the Company reduced the maximum net price (1908) to $1.70, and in 1910 to $1.65. At the same time the annual dividends to shareholders rose to 6½ per cent. The policy of decreasing the maximum net price, until a uniform price for all purposes should be reached, was being steadily pursued and proving a recognized benefit to the Company and the public.

It seems to be true that, while the Company's policy in the active exploitation of the gas stove business at the differential rates led to the satisfactory results described, it was also productive of a certain amount of complaint from consumers. The Company, yielding at first to the solicitation of those who, having a gas stove installation only, wanted to use a single additional burner for lighting through the same meter, later found that this practice had almost imperceptibly extended, until certain customers were obtaining all their lighting at the fuel rate, and those on whose premises the 2-rate system of charge was strictly maintained complained that they were unfairly discriminated against because of the lighting rate which they were compelled to pay. The Company was frequently burdened with the installation of 2 meters for the same customer, one for lighting and the other for fuel, the increased cost for installation, maintenance and care as well as for accounting and billing incident thereto, and with the difficulty of demonstrating to dissatisfied customers the reasonableness of such a differential.

In January, 1911, nearly all the outstanding stock passed to new owners. As was reasonable to expect, the new management held new views as to the best method of conducting the affairs of the Company; but, in putting these views into practice, the operating costs were increased. This fact, combined with the difficulties just described, seemed to invite a readjustment of rates. As a reduction of the maximum net price for lighting purposes seemed to the management to give no reliable promise of the additional income desired, the rate for gas stove use was advanced to the maximum net price, although the rate for manufacturing purposes was not disturbed. This action was followed by this complaint to the Board, and it was distinctly stated at the hearing that, but for the change in policy, of which it was significant, this complaint would not have been brought.

Evidently this advance in price has failed to provide the income sought to meet the changed conditions in the Company. In the two years ending with June 30, 1912, while meter sales for all purposes increased by only about 300,000 feet and the receipts therefrom less than $1,000, the operating profits decreased nearly 50 per cent. It has become evident that, if the reasons for the first advance were sound, another advance may now with equally good reason be demanded.

Even if it be within the Board's province, it is unnecessary to discuss at this time the expediency of the particular changes in method to which the additional costs under the present management are attributable. It is true the costs were decreased in some directions, but they were much more largely increased in others. That a profit reasonably satisfactory to the former management was possible at the rates then existing has been amply demonstrated, nor is it likely that these profits would have been seriously or permanently disturbed by further reductions of the maximum net rate in harmony with the suggestions of the Board, already quoted, and in pursuance of the original purpose when the fuel rate was first established. Indeed, it was probably due to the expectation of an early attainment of a uniform price that the discriminatory conditions which have been described were allowed to develop. It is not unlikely that these conditions had become sufficiently fixed so that they would be cured in no other way.

In considering the purchase of the Company and the introduction of the new business methods, the foregoing considerations ought not to have been overlooked by the new owners. It was their privilege to assume the risks incident to the course pursued, but an attempt to arbitrarily impose the unfortunate results upon the public would probably not have been made except for the possession of a monopoly. Operating as well as investment expenditures should be directly related to the needs and conditions existing in the community. Unnecessary expenditure in either direction must be at the risk of the owner. He is bound to have due regard to the needs and reasonable demands of the community to be supplied when deciding upon the necessity or advisability of expenditures proposed. A reasonable return presupposes reasonable costs, and reasonable costs are determined by a consideration of all ths conditions surrounding the business. If a company's methods and general policy be unreasonably costly, or so obviously unwise as to decrease its earning power or check the growth of its business, these things may be of great importance in determining the amount of a reasonable return. Some of the recent increases in operating costs are probably temporary only, and may not again occur. The reasons for increasing the expenses were insufficient to justify them, if thereby it became necessary to advance the price. While they may have satisfied the hasty judgment of the management, they added no distinctive value to the Company's product.

In the opinion of the Board, under all the conditio ns surrounding the supply of gas in Natick, the price hereinafter named is sufficient to yield a reasonable return upon the value of the pr operty actually and necessarily employed for the supply of gas in the territory which the Company serves. The Board, therefore, recommends that on and after the 1st day of December next, the net price of gas supplied by the Natick Gas Light Company shall not exceed $1.50 per 1,000 cubic feet.

Report of Committee on Small Gas Engines.

[Presented to the Consideration of the American Gas Institute, Seventh Meeting.]

This report is not intended to recommend particular makes of engines, nor is it to be filled by a mass of confusing figures in an attempt to cover every city in the country. The tables are given principally for illustrations. Further information regarding the sales of electricity for power may be obtained from the Reports of the Board of Gas and Electric Light Commissioners The term small gas engines in this report means engines 25-horse power and under.

Quoting from the instruction of the Technical Committee to this Committee: "The object of this report is two-fold. First, to bring strongly to the attention of the membership of the Institute the need of such an engine, and our lack of it; secondly, to bring to the attention of the manufacturers of engines the advantages of supplying this demand." Your Committee does not fully agree with the statement "the lack of it," but has quoted it in order to bring out discussion and to give the engine builders an opportunity to speak for themselves. Doubtless many improvements may and will be made in gas engines, but Table I. illustrates that there are some good engines, also that there is plenty of room for more. It would appear that the principal object of this report should be to impress on the membership that the gas engine is one of the best gas sellers, that it creates a day load and the importance of selecting the best available engines. Each case should be studied before an engine is recommended and every point be considered in order that no failures result:

TABLE I.—*Gas Engines and Electric Motors Installed in Five Representative Cities in the United States.*

Population of district Supplied.	H-p. of Engines and Motors.	Electric Motors. No.	Electric Motors. Av. H-p.	Electric Motors. Total H-p	Gas Engines. No.	Gas Engines. Av. H-p.	Total. H-p.
675,000....	1 to 5	..	..	..	88	3.7	326
	5 to 10	..	..	..	113	7.7	870
	10 to 15	..	..	..	48	13.8	662
	15 to 20	..	..	..	14	1.94	272
	20 to 25	..	..	..	2	22.0	44
	Totals.....				255	..	2.174
575,000....	1 to 5	670	2.8	1,849	159	3.1	4.93
	5 to 10	192	8.2	1,625	117	8.2	959
	10 to 15	78	13.1	1,024	67	13.2	884
	15 to 20	49	17.8	872	24	18.7	449
	20 to 25	18	22.7	409	8	24.5	196
	Totals.....	1.007	....	5,779	375	....	2,981

Population of district Supplied.	H-p. of Engines and Motors.	Electric Motors. No.	Electric Motors. Av. H-p.	Electric Motors. Total H-p.	Gas Engines. No.	Gas Engines. Av. H-p.	Total. H-p.
500,000....	1 to 5	509	2.5	1,273	75	2.9	218
	5 to 10	168	8.6	1,445	41	7.9	324
	10 to 15	74	14.7	1,088	15	13.3	200
	15 to 20	31	19.9	617	12	19.3	232
	20 to 25	..	..	..	..	..	..
Totals.....		682	....	4,423	143	. ..	974
225,000....	1 to 5	346	2.8	969	35	2.5	88
	5 to 10	79	8.6	679	26	9.0	234
	10 to 15	26	13.8	359	11	13.5	149
	15 to 20	14	19.4	272	5	18.8	94
	20 to 25	..	..	..	1	25.0	25
Totals.....		465	....	2,279	78	....	590
80,000....	1 to 5	92	3.0	276	7	3.9	27
	5 to 10	16	8.7	139	..	..	..
	10 to 15	3	15.0	45	4	12.7	51
	15 to 20	1	20.0	20	..	..	..
	20 to 25						
Totals.....		112	....	480	11	....	78

This table shows that these gas companies are pushing the engine business and that there is yet a very large field to be covered. In the above cities there are also in use some ⅛ and ¼-horse power engines and engines larger than 25-horse power.

In addition to replacing electric motors with gas engines, there is a large amount of available business replacing gasoline engines and small steam plants and putting engines into new power plants. Gas engines may be used for substantially all purposes as electric motors, and although gas is the cheaper power, yet electric sales for power are far in excess of those of gas. It is, therefore, apparent that many gas companies have been neglecting this branch of the business. Possibly the engine builders are also at fault for not catering sufficiently to the gas companies and also their consumers. Graded discounts for quantities of gas used help to sell engines, and form a very attractive proposition to all large users of gas.

To illustrate some of the various uses for gas engines, the data in Tables II. and III. is given. Quoting from a letter received from the first company: "The uses to which (gas) engines are put, are so various that to give all of them is impossible within the scope of a single letter. However, those trades in which more than 10 engines are used are as follows:

TABLE II.—*Gas Engines Installed in an Eastern City of the United States. Trades in which more than 10 engines are used.*

Bottlers	15	Machinists	196
Brush manufacturers	11	Metal spec. mfrs	94
Carpenters	38	Novelty goods	13
Chemists	15	Packers and canners	43
Coffee roasters.	15	Paper mfrs	11
Ice cream manufacturers	163	Paper box mfrs	10
Electric specialty mfrs	12	Printers and engravers	95
Electricity generators	14	Sheet metal workers	33
Feed dealers	13	Stables	26
Fixture manufacturers	18	Stone cutters	12
Foundries	23	Textile mfrs	54
Garages	11	Wagon builders	18
Glass manufacturers	12	Warehouses	19
Butchers and grocers	14	Wood workers	92
Leather goods mfrs	14	Worsted mills	13
Total			1,117

TABLE III.—*Gas Engines (25-Horse Power and Smaller) Installed in a City of about 650,000 Population.*

Trade.	No. of Engines.	Avg. H.P.
Bakeries	71	6.45
Barbers' supplies	1	7.0
Blacksmiths and wheelwrights	2	6,5
Bedding mfrs	1	10.0
Boat builders	1	8.0
Bottlers	2	6.5
Belt mfrs	2	16.0
Bookbinders	1	6.0
Bottle mould mfrs	2	9.0
Brass works	5	11.8
Broom mfrs	1	4.0
Butchers	1	3.0
Can establishments	4	16.5
Candy mfrs	2	7.0
Carpet cleaners	7	16.5
Carriage builders	7	7.0
Cigar box mfrs	4	11.0
Cigar mfrs	1	10.0
Confectioners' supplies	1	12.0
Coal and wood dealers	6	7.16
Cooperage	1	15.0
Coppersmiths	1	5.0
Coffee dealers	1	4.0
Dairy products	1	15.0
Dry goods	1	6.0
Electrotyper	1	15.0
Elevators	3	16.0
Factories	9	15.0
Foundries	1	12.0
Feed and grain	3	19.0
Furniture	2	6.0
Garages	2	3.5
Gas engine mfrs	1	8.0
General contractor	1	14.0
Grinders	3	11.3
Grocers	5	4.2
General store	1	4.0
Harness mfrs	2	10.0
Ice cream mfr	38	4.3
Iron estab	4	11.75
Junk dealers	1	10.0
Kimono mfr	1	6.0
Lard mfr	1	10.0
Laundries	2	4.25
Liquor dealer	1	6.0
Livery stables	2	6.0
Machine shops	26	10.0
Macaroni mfr	1	6.0
Mattress mfr	1	15.0
Mfr. jewelers	1	15.0
Metal plating	4	11.0
Miscellaneous	5	4.8
Overall factory	6	11.3
Paint estb.	4	11.25
Paper box mfrs	6	11.1
Pattern mfr.	1	12.0
Pickleing estb	4	4.5
Plumbing fixtures	2	13.5
Potteries	1	6.0
Printers	20	10.0
Pumping stations	9	7.6
Refrigerating plants	10	11.0
Sheet metal	2	9.0
Shirt mfrs	4	14.75
Shoe mfrs.	5	9.4
Surgical instruments	1	6.0
Specialty mfrs	4	14.25
Stone cutters	1	2.0
Tailors	2	4.0
Telephone exchanges	4	8.25
Tile mfrs.	2	7.0
Toy mfrs.	4	9.75
Warehouses	2	22.5
Total	343	

Several gas engine builders were communicated with and Table IV. is made up from their answers. It shows that an engine of most any size may be bought from any one of many manufacturers.

TABLE IV.

Mfr. No.	Size of Engines Built.	Remarks.
1	4-h. p. and larger	
2	30-h. p. " "	This company built a 12-h. p. engine but, as the sales were not sufficient, it was discontinued. The building of smaller sizes is now under consideration.
3	½-h. p. " "	
4	1-h. p. " "	
5	1-h. p. " "	
6	6-h. p. " "	If the demands were sufficient, this company would make smaller sizes.
7	2-h. p. " "	
8	8-h. p. " "	This company is selling gasoline engines of 1-h. p. and larger and is preparing to build gas engines of the same size.
9	None	This company builds multi-cylinder gasoline marine engines and is experimenting with a gas engine of similar type, which will possibly be put on the market in the near future.

Summarizing.—It is apparent that many gas companies are neglecting the engine business. Good gas engines are available, but there is probably room for improvement, and if the gas companies do push this branch of the business they will reap the reward by

selling more gas and the demand and competition thus being increased, the builders will use every effort to improve the quality and efficiency of their engines.

Your committee begs to thank the several gentlemen who furnished the data tabulated in this report. CARROLL MILLER,
Committee.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, November 9, 1912.

Bumbledom at Brighton.—A Gas Man and a Tunnel.—Exhibitions.—A Discussion on Carbonization.

It will probably be a matter of some surprise to many of you readers to know that a lamp projecting 2 feet 9 inches from the facia of a shop window, and having a globe 7 inches diameter, on which the word "Clark" appears in 2-inch letters, is a public annoyance, nuisance and danger, Yet such was the ruling of the Brighton corporation. The public thoroughfares included in the district of that well known seaside resort are disfigured by all such monstrosities in the way of skysigns, large colored posters, etc., so the present action is decidedly in the direction of straining at a gnat and swallowing a camel. The *crux* of the matter appears to lay in the use of the word "Clark," which the corporation in their wisdom considered to be an advertising sign, and they called upon the proprietors of two shops belonging to Clark's Bread Company, over which these fearful and dangerous appliances were in use, to take out the word "Clark," or failing that, to remove the lamps. Clark's Bread Company, however, possessed some measure of that sturdy independence that has come from old puritan stock, and declined to take any action. Whereupon the corporation removed and seized the offending lamps, but afterwards, finding they had exceeded their powers, intimated that they would give up the lamps if sent for. Against this action the Company entered an appeal at Quarter Sessions. The Recorder gave judgment that, in view of the fact that no public nuisance, annoyance or danger had been proved, the action of the corporation was wrong, and allowed the appeal with costs. In what way the expenditure of public money in connection with this action is likely to prove any utility, or to bring any return, is a matter that might occupy the attention of the local Traders or Ratepayers' Vigliance Association.

The explanation of the affair is that the corporation, like many others, have gone outside their own proper and legitimate sphere and engaged in trade, by undertaking the supply of electricity. If it is legitimate for them to engage in the sale of electricity, it is equally so as regards bread, beef or beer. And like other venders of electricity they find that the popularity of gas so supplied by a well managed private company is a serious hindrance to the extended use of their commodity, and have adopted a policy of labelling, obstructing and hindering the use of gas by every available means. Threatened men, it is said, live long, and this endeavor to create prejudice against gas is one of the most valuable advertisements in its favor. In a town in the north of England, some time ago, most virulent attacks were made upon gas at the instance of the Municipal Electricity Committee. And I noticed, a short time since, that the gas company in that town had paid full dividends and reduced the price of gas, but that the electric supply has resulted in a large deficiency that has to be paid out of the public rates. Following this policy, the Brighton corporation have adopted the not particularly creditable tactics of calling in the aid of an old act of Parliament as a weapon for an attack on the gas company, who, following the usual practice, supply a large number of lamps similar to those called in question. The ostensible object of the proceedings was to improve the appearance of the public thoroughfares. The real one was to prejudice the use of gas, and to force the use of electricity. If the attempt had succeeded, a serious blow would have been struck at a very important branch of the gas business, the outside lighting of shops. In every town throughout the country will be found a large number of outside lamps arranged to serve the dual purpose of effectively lighting the shop windows, and with the aid of lettered globes or screens, of an illuminated advertisement sign.

Another case in which the provisions of Acts of Parliament intended for public convenience and safety, were perverted to serve private purposes, has occurred at Worthing, and after protracted litigation has resulted in favor of the gas company. The extension of their business necessitated a new gas works outside the district, and they obtained the usual powers for this purpose, including the right to lay mains in public thoroughfares. In connecting up to the new works it was neccessary to lay a main through a lane, the soil of which was vested in the plaintiff as the owner of the land on each side. In English law the owners of property have centain rights and responsibilities extending to the center line of any public highway adjoining, so that the owner of land on both sides of a public road has control over such road so far as it adjoins his land. The plaintiff first contended that the public highway rights applied to the surface only, and that the subsoil was his property. On this point it was decided that the highway rights included a sufficient depth of soil for the making of the road, which was fixed at 18 inches. He then conceived the idea of practically blocking the road by the erection of a tunnel from one side to the other, the crown extending to within 18 inches of the surface. The arch enclosed the defendants' pipe and he then took advantage of a clause in the Act specifying that no gas main may by laid through or in contact with a building, and was successful in getting the pipe removed. The gas company then devised a special arrangement by which the continuity of the main was maintained without touching the tunnel, the gas being carried over the crown of the arch in a shallow, rectangular casing supported by strong concrete piers on each side, in such a manner as not to come in contact at any part with the tunnel. It was endeavored to show in the Court of Chancery that this arrangement constituted a trespass on land not dedicated to public use, but the Judge dismissed the action with costs.

A similar feature in these two cases is that no real grievance existed, but that the law was called in to create a fictitious one. The lamps did not annoy or injure any one, and a gas main laid through the lane would not cause the loss of one penny piece directly or indirectly to the owner of the adjoining land. No doubt this fact commended itself to the authorities who delivered judgment. An interesting point in connection with the last named case is that if an owner of land on both sides can control the whole road, the owner of one side can exercise a similar right as regards half the road, and two opposite owners agreeing together could practically blackmail any company or authority requiring to use the subsoil for gas, water, sewerage, or any other purpose. I know instances of gas companies who were under the necessity of carrying a main through private land and had to pay the owner as much as £800 per mile, a price far exceeding the value of the land occupied, or any consequential damage. The value of the land occupied, seeing that the concession necessitates right of access, is a fair market price. But any excess above that value is blackmail.

The season of exhibitions is again upon us, and the most satisfactory feature is that, on account of the great activity amongst manufacturers of gas appliances, it is possible to get up a good, attractive and really novel display. As I remarked last year, the new forms of apparatus render themselves readily to the formation of a really well arranged and tasteful exhibit. As an instance in point, reference may be made to the stand erected by the Gas Light and Coke Company at the Universal Cookery and Food Exhibiti on, held at the Royal Horticultural Hall, Westminster. This was semicircular in plan, somewhat resembling a built up scene at the theater, which is further suggested by the straight, open front and handsome, decorative groups of plants on each side. The appliances on view are arranged round the curved background, thus securing for each article a clear, unbroken view from the front, and leaving a clear space available for visitors who wished to consult the three competent advisers in attendance. The chief object was to supply a practical illustration of what gas can do, so there was no duplication, but a single specimen of gas fire, gas cooker, circulating boiler with lavatory basin, bracket, pendant and pillar lighting. The lighting was controlled by the telephors and pneumatic systems, so that a touch of the button was sufficient to start or stop it. The public largely patronized the stand, both for the purpose of consulting the advisors and for personally testing the various appliances.

The model house at the Edinburgh Gas Commissioners' Exhibition is another example. This comprised completely furnished specimens of the drawingroom, kitchen and other parts of a modern dwelling house, each appropriately fitted with gas appliances, the whole illustrating the uses of gas in all departments. A special feature of this exhibition was an outside display of high pressure light, comprising 15 points, representing an aggregate of 44,000-candle power, apart from the inside lighting, which was also on the high pressure system, and included lamps ranging from 1,500 down to 200-candle power.

This exhibition was largely attended and was in every way a great success. During the 10 days it was open the number of visitors was 65,000, comprising all classes of the population, who not only inspected and inquired, but in many instances gave orders. The cooking demonstrations were so popular that it was necessary to give four each day, the audience in each case amounting to 600 or 700, and on the closing day it is estimated that at one time there were 10,000 people in the building.

Early in the year Dr. Davidson, of the Birmingham Corporation Gas Works staff, read a paper on carbonizing before the Midland Association of Gas Managers, setting forth the results of experiments on a substantial working scale, with various typical patterns of carbonizing apparatus, and followed up with some communications to the technical press. A special meeting was recently held to discuss the subject, at which there was a large attendance, and a good discussion if length is any proof of quality. The speakers included such well known authorities as Mr. J. Ferguson Bell, Dr. Harold G. Coleman, Dr. R. Lessing, Mr. S. Glover, Mr. A. T. Duckham, Mr. T. Glover, Mr. Geo. Helps, Mr. W. W. Townsend, Mr. H. E. Copp, and Mr. John West. It must be confessed that the result is disappointing, so far as the ordinary rank-and-file is concerned. Mr. Helps put the point plainly, towards the close of the proceedings, by saying they had heard a highly scientific discussion, but they were there to get down to broad issues rather than to argue about one or two points per cent. What they had heard about horizontal and vertical systems conveyed the impression of six-of-one and half-a-dozen of the other, and he would like to go more into the *A B C* of the subject, and find out how to give the consumers not necessarily cheaper gas, but more value for their money. The discussion partook more of a debate upon detail between specialists, than of the considerations that apply to the average gas manager, who has to deal with carbonization as one detail out of many, rather than the one and only occupation. In the largest undertakings it is possible to make a separate and special department of the carbonization, under the control of a highly educated head. But the average country gas works, doing one to two hundred millions cubic feet of gas per annum, cannot attain to such a point, and a strong feature in the smaller works is that the carbonizing plant shall be so simple and reliable in character as not to overtax the abilities of the average gas works foreman. The manager has no time to spare for the continual nursing of a bed of retorts, or anything else.

The lack of definite point, that was so evident in the discussion, is largely due to the fact that gas engineers are by no means united as to the end in view. Up to a very recent date it was broadly assumed that the object to be sought for was to increase the yield of gas and of illuminating value, or later, of calorific value; 10,000 feet of 18 candle gas represented 180,000 candle feet per ton, and 12,000 feet of 16 candle gas equalled 192,000 candle feet per ton, and was, therefore, an improvement. Or some preferred to substitute B.T.U. for candle power and to aim at the highest yield in B.T.U. per ton. So far there is something definite. But when we substitute for this the highest market value for gas and products combined, we enter upon an indefinite quantity that may be different in every district. Gas is no longer the primary, and coke or tar the residual products. Some engineers do not want more gas if it means less coke or less tar. Under such conditions a discussion intended to elucidate the best system of carbonization can only hold good as applied to one particular district or set of circumstances. Things may be altogether different as regards the next town.

Recent Patent Issues.

Prepared for the American Gas Light Journal by Royal E. Burnham, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,043,822. Manufacture of Water Gas. A. G. Glasgow, Richmond, Va.
1,043,871. Combination Gas and Coal Grate. M. I. Scanlon, Cleveland, O.
1,043,938. Safety Device for Gas Lamps. F. Huttenlocher, Charlottenburg, Germany.
1,043,946. Automatic Igniting and Extinguishing Device for Gas Burners. O. S. Lied, Christiana, Norway.
1,043,983. Steam and Gas Meter and Calorimeter. C. C. Thomas, Madison, Wis.
1,044,364. Gas Stove Attachment. C. P. Ellis and M. P. O'Donohoe, Nashville, Tenn.; said O'Donohoe assignor to said Ellis.
1,044,380. Gas Heater. F. P. Harker, Cincinnati, O.
1,044,456. Gas Water Heater. A. Horwitz, Montreal, Canada.

Items of Interest
FROM VARIOUS LOCALITIES.

On the morning of November 20th, Referee H. T. Reed, of Albion, N. Y., in the law offices of Messrs. Ryan and Skinner, offered (under foreclosure proceedings) for sale the properties of the Medina (N. Y.) Gas Company. The final bid was made by Mr. Thomas G. Hinds, of New York, whose offer was $15,000. The purchaser declares that, when the final particulars respecting the sale are completed, the plant will be reconstructed to the end of giving Medina that which it has not had for many years, adequate gas supply.

At the annual meeting of the shareholders in the Buffalo (N. Y.) Gas Company, the Trustees elected were; Dr. Alex. C. Humphreys, and Messrs. R. L. Fryer, R. C. Pruyn, F. D. Locke, H. Seligman, Jas. Richardson, Stephen Peabody, Emile Guillaudeu, L. L. Babcock, A. S. Wilber and W. S. Riselay.

"W. V. V.," writing from Stamford, Conn., under date of the 20th inst., declares: "The management of the New Haven (Conn.) Gas Light Company—and I make bold to say that no more considerate attention is given to any other Company's patrons than that offered by itself—held a most important meeting this week, at which many matters of moment were considered; matters which were of abounding interest to the shareholders, to the public at large and to the gas fraternity in general. To begin with it was voted to reduce the gross selling rate to $1 per 1,000 cubic feet, less the usual discount of 10 cents per 1,000 for prompt payment; and it was also voted to increase the capital stock in the sum of $500,000, which emission will bring the total shareholdings to $5,000,000. These bold statements seem to prove my initial suggestions that the Company had a very busy day of it recently. The stock is to be paid for in four installments of 25 per cent., the paying times being: February 1, 1913; July 1, 1913; January 1, 1914; July 1, 1914. The new stock, when issued, will participate in the dividend payable the 30th September, 1914. Subscriptions are to be handed in by January 2, 1913, each holder of 9 shares, of record the 19th November last, to have the right to subscribe to 1 new share new stock. Interest, at the rate of 5 per cent. per annum, will be paid on partial sums deposited according to the purchase-and-sale agreement; but no interest will be earned upon sums paid prior to the date when such installments are due. According to Secretary Norcross the new capital secured will be expended in general plant extensions and developments incident therewith, and in paying for pipe line extensions, in which respect the Company's plannings are more to the point than those of any other Company in New England, save one; and in this I think I'm right, the exception being the admirably-managed Company in Lynn, Mass. Within 8 years the New Haven folks have gone south to Milford; east to Pine Orchard; north to the Cheshire line; and west to the Housatonic river. This easily means the placing of 30 miles of leading mains; and, to the credit of the planners, be it said, not a mile of either mains or laterals is at the moment unproductive. The Company's beautiful business quarters are much appreciated, both by the public and the employees; and I here may add that the new rate becomes effective on consumption dating from the opening of the new year."

Dear Journal: The Baltimore Consolidated Gas, Electric Light and Power Company is nothing, if not original, as was again amply and beautifully shown in an assemblage of the women in its employ. The Company's Industrial Building was the place, the evening of the 19th November was the time, and the occasion was an informal reception tendered the gentler sex by that clever gentleman of the concern, President J. E. Aldred—unfortunately an unlooked for business summons brought him to New York the evening in question. However, he was ably represented by that persuasive gentlemen, Vice-Prestdent Charles M. Cohn, assisted by that other "society's clerk," Vice-President Wagner, both being well, yes, ably sustained in the reception detail, by charming Mrs. Henrietta Wilmer Lawrence, whose mastering manner as Presiding Officer was of winning rather than of dogmatic way. That about 3 score and 10 of the women employees reported for the speeches and the supper, and the miscellaneous brought the total to 200. Addresses were made by Misses Lillian Riehl and M. A. Dahmey, and that estimable Brooklyn Adonis (Mr. Douglas Burnett), also rendered a talk that further endeared him to his hearers. An entertainment medley followed the set address, after which an entertaining supper was served. The whole affair constituted really a sparkling occasion.—M. S."

THE women of Rock Hill, So. C., are up in arms, fighting for the planning of a gas works in that thriving borough. One of the "crowd" recently addressed a letter to the Chairman of the City Council, asking that the granting of a franchise be considered favorably forthwith, the said petition terminating in this sentence: "If the men of Rock Hill had to worry with keeping cooks and preparing meals they would get busy and have a gas plant installed in Rock Hill in the quickest time possible." Come, Messrs. Councilmen; get busy!

MR. F. A. PRICE, of Youngstown, O., it is said, has completed all the preliminaries necessary to the construction of a gas plant in Taylor, Tex. The O'Conner Brothers, of Waco, Tex., are at the present time constructing a sewage system in Taylor.

MR. DANIEL G. TYLER, of Lexington, Mass., has been elected President of the Cambridge (Mass.) Gas Light Company, vice the late Mr. Willard G. Bullard. Mr. Tyler was elected to the Directorate of the Company in 1887, and his father was the Company's President in the periods from 1877 to 1886. Mr. Tyler is a conservative man, whose fame in active financial districts of Massachusetts is almost so solid as is the basing of Plymouth Rock.

THE great (?) and only (? ?) William D Marks is again a supplicant for a job on the reducer's side—he has'nt been doing much testifying recently, even at cut rates. However, like the large birds that tightly grip top branches of the flowering cypres that luxuriates in the Bayon Teche country, he scented a possible job in the vicinity of Trenton, N. S. Thus he knew that Mayor Donnelly, more power to him, was issuing the calls of his "causeway" brains, in an attempt to secure "for the public" a reduction in the rates that were being charged them for gas and electricity. And there he felt 'twas his duty to be; to prepare for the slaughter, and accordingly to flee from the tree. Railroad fares being rather higher since the enforcement of the "Long and short haul clause," he impressed the U. S. Mails as forwarders by depositing therewith a letter addressed to Mayor Donnelly, saying that he (Marks) was on deck for duty. He then iterated 'partical list' of cities, the lighting cause of which had (as to the ordering of lower charges), been successfully espoused by him. The list included the names of 8 places in which, after his testimony had been given, the rates had been decidedly reduced, and concluded his appeal by thus whining: "If you desire an investigation of gas or electricity prices, or of railway rates, I will be glad to serve you on moderate terms.

"Soliciting your favorable consideration and correspondence," etc. "Is it not pitiful, near a whole city full, job he had none!" Slightly adapted from the original of the poet Hood.

THE Messrs. Dutton have disposed of their interest in the Hanover (Pa.) Gas Company. It is worthy of note that, since these gentlemen secured the Hanover gas properties, the value thereof has increased 6-fold since they acquired them in 1905 or so.

As one result of the report of the investigation by the Finance Commission, city of Boston, respecting the city departments, it is recommended that this action be taken: "To remove David A. Finnegan, Superintendent of gas fitting, and put a competent man in his place."

"G. M.," forwards this from Des Moines, Ia., under date of the 24th ult.: "The Des Moines Gas Company has determined to appeal the 90-cent gas case to the Supreme Court of the United States. The appeal has been filed with Clerk C. W. McArthur, of the Federal Court, and a bond of $5,000, issued by the United States Fidelity and Guaranty Company, of Baltimore, as surety, accompanies the appeal as a cost bond. The Company must also place in the hands of the Federal officials a bond of $150,000, as decreed by Judge Smith McPherson, to cover the 10-cent rebate to the consumers, if the new rate is eventually sustained by the Washington Court. The Company must re-imburse consumers, from January 1, 1911, to November 15, 1912. The ordinance went into effect January 1, 1911, but the 90 cent rate was not established until November 12, 1912. Judge Willis Van Deventer, of the United States Supreme Court, granted the appeal. Sixty-six counts are named in the Gas Company's petition, all of which allege errors in the ruling of Judge McPherson. A big task must be completed by the Courts before December 18th, on which date a complete transcript of all evidence, along with documents, exhibits, records and the like, must be in the hands of the Supreme Court. By the ruling of the Supreme Court the final adjudication of the gas litigation will be taken up the 18th inst."

FOLLOWING the annual meeting of the shareholders in the Bay State (Mass.) Gas Company, the following officers were re-elected: President, Thos. W. Lawson; Vice-President, J. Frank Allee; Treasurer, W. Harry Miller; Secretary, E. A. McSweeney. The most pronounced period in the stockholders' session was shortly after the appearance of stockholder G. S. Fisher. He brought with him a quantity of large, red apples, which he presented solemnly to the shareholders, emphasizing the fact that it was the "first dividend" ever declared by the Bay State Gas Company, and hoped it would be heartily enjoyed by the shareholders, even though the return was not as substantial as it should have been. The apples were received and munched, and the giver was granted a special resolution of thanks."

THE jury before whom was tried the case of George S. Bell, Jr., against the Providence (R. I.) Gas Company, who sued for $25,000 damages, alleging that the latter had damaged his oyster beds through negligently permitting tar, sludge acid, and the like from its works to the ruin of his oyster beds, awarded a verdict to the plaintiff. The damage was set at $15,000.

THE Buena Vista (N. J.) Township Committee has granted a franchise to the Millville (N. J.) Gas Light Company, under which the latter may furnish gas to the residents of Minotolo and Landisville; but the selling rate is put at $1.

AT the November meeting of the employees of the Bronx (N. Y.) Gas and Electric Company, Superintendent J. M. Butler called the meeting to order, and, as a member of the "Evening's Committee," he regretted not having had time to prepare anything of special nature for the session. He then turned the direction of the session over to the next number. But in this "explanation" he failed to mention the fact, however, that he had been instrumental in procuring for the use of the Committee a stereopticon machine which was purchased by the management for their meeting purposes. Mr. W. A. Root (the Company's Commercial Manager) following Mr. Butler, read a very interesting paper on "The History of Commercialism and Its Relation to the Central Station." Mr. Fred. Towers, Superintendent of the electric station, than read a paper narrating a reply to the query, "What Becomes of a Pound of Coal?" His story was most interestingly told, and the value of the text was much enlarged by means of many slides and charts. The matter was so entertaining that it evoked a discussion which really had to be peremptorily closed by President Rosenquest, who, as one further reason for closing the debate, expressed the fear that the "B.T.U.'s" and a prolonged forced draft might do dire damage to the Club's new coffee urn. Luckily such untoward happening was not, for delicious coffee was freely yielded in plenty by said urn, when during the "after luncheon" that preceded adjournment, its tap was turned on. Everybody seems to regret that the December re-union is seemingly so far away.—* D. *.

UNHAPPILY, Mr. George Griswold had to resign his position with Twin State (Vt.) Gas and Electric Company, owing to ill health. His successor is Mr. Nicholas Cone.

THE Chicago *Examiner* (of recent date) says: Extensive improvements have been made by the San Diego (Cal.) Consolidated Gas and Electric Company, which properties are under the dominion of Messrs. H. M. Byllesby & Co. The Company now has 344 miles of gas mains, and 1,530 miles of electric wires.

LAST month Dr. Edwin P. Seaver, Jr., delivered a series of lectures before the employees of the New Bedford (Mass.) Gas and Edison Light Company, the subject matter of which was how to deal with persons overcome by either gas or electric currents. The Company is fully equipped with the pulmotor service. His next course will deal with effective remedial measures in respect of physical injuries.

LAST month, at the intimation of Mr. R. C. Fowler, Advertising Manager of the Detroit (Mich.) Gas Company, General Manager Butterworth has instituted a series of "educational talks" before the employees, intended to cause them to attain greater preficiency in their business. The meetings are to be held each fortnight during the winter, at 10 P.M., and if we know anything about the genial gentleman, Manager Butterworth will not send the students home supperless.

The Market for Gas Securities.

Off ¼ point is the net result of the trading in Consolidated Gas during the week, although several lots changed hands. It is surely in the cards that the beginning of the end is at hand, in that the first step has been taken which eventually means the putting out of business of at least one of the subsidiaries. The one in question is the Equitable, in which a few shares are non-assenting to the merger that resulted in its control or ownership by the Consolidated. That it is proposed to put the concern completely out of business is shown under the notification to shareholders. The outstanding stock will be appraised by a Court Commission.

Brooklyn Union is strong, although actual sales in it are few and far between. The opening to-day (Friday) was 143½ to 146. Peoples, of Chicago, is steady, although not as strongly in demand as of late. President Sullivan, of that huge corporation, is certainly a "smoother." The regular quarterly (1¾ per cent.) on the shares of the American Gas Company is payable since last Saturday. The Cleveland (O.) Trust Company has called for the redemption of $5,000 of the first 5's of the Citizens Gas Light and Coke Company, of Findlay, O., under the provisions of the trust deed. The submission term expires the 17th inst.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

DECEMBER 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	142	143
Central Union Gas Co. —				
1st 5's, due 1972, J. & J.	8,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	3,600,000	100	182	187
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	101	102½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	99½	101
Standard	5,000,000	100	60	70
Preferred	5,000,000	100	90	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	143½	146
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	180	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅜	½
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084	—		—
Mortgages, 5's	3,400,000	—		—
General Mortgage 4½	10,661,000	—		—
Con. Gas Co., Baltimore City, 4½	2,751,000	—		—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Detroit City Gas Co.	6,580,000	—	—	50
Detroit Gas Co., 5's	381,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	130	133
" Bonds, 5's	10,500,000	—	101	106
Indianapolis	2,000,000	—	38	45
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	91	95
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	98½	99
Laclede Gas Co., St. Louis.	10,000,000	100	105	106
Preferred	2,500,006	100	99	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	120	130
Madison Gas and Electric Co. " 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	92¾	93
Preferred	25,000,000	100	94	95¾
Montreal Gas Co., Canada	2,000,000	100	223	225
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	182	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	115½	116
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
Pacific Gas and Electric Co.	15,500,000	—	65	65½
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	94	98
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	420	425
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 15-17, 1913. Officers: President, W. R. Addicks, New York City. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting Sept. 1913. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keilior, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 8, 1913. Officers: President, C. G. M. Thomas, Long Island City, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Gas Meters.—Next Meeting, Newark, Dec. 18; Chairman, Will W. Barnes; Commissioners, W. H. Pettes, I. W. Petty: Secretary, H. Thurston Owens, 42 Pine street, New York City. Philadelphia Section; Chairman, L. R. Dutton; Commissioners, S. Grady, H. P. Dains: Secretary, H. F. Patterson, Jr., 834 Chestnut street.

Guild of Gas Managers of New England.—Annual meeting, March, 1913. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 19th and 20th, 1913. Chicago, Ills. Officers: President, H. O. Channon, Quincy, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting,———— September, 1913. Meetings of Sections, monthly. Pres., V. R. Lansingh, Cleveland, O.; Sec., Preston S. Millar, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March 12 and 13, 1913. Indianapolis. Officers: President, Howard L. Olds, Indianapolis; Vice-President, Wm. Wallace, Lafayette; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, Burlington, Ia., May 22, 23, 24, 1913; Officers: President, C. W. Fair, Atlantic, Ia.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October—— 1913. ———— Officers: President, L. O. Ripley, Emporia, Kas.; Secretary and Treasurer, W. H. Fellows, Leavenworth, Kas.

Michigan Gas Association.—Annual meeting, September——1913; ———— Officers: President, W. S. Blauvelt, Detroit, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1913; Joplin, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and Gas Show, Dec. 2-5, 1912. Atlanta, Ga. Officers: President, C. L. Holman, St. Louis, Mo.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, Cleveland, O., May, 1913; Officers: President, M. B. Daly, Cleveland, O; Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February,———————1913 Boston. Officers: President, D. D. Barnum, Worcester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Winter Meeting, December 18, Newark N. J.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn Belmar, N. J.

Ohio Gas Association.—Annual meeting, February ———, 1913, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, May, 1913. President, Noel R. Gascho, Alva, Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, San Jose, Cal., September 16, 17, 18 1913. Officers: President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, Henry B stwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, York, Pa., April, 1913; Officers, President, H. H. Ganser, Norristown, Pa.; Secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 13, 1912; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, Charlotte, N. C., April———— 1913, Officers: President, C. E. White, Montgomery, Ala.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April————1913, Galveston, Tex. Officers: President, F. M. Lege, Jr., Galveston, Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May ———— 1913, Milwaukee, Wis. Officers: President, I. F. Wortendyke, Janesville, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.